NEW ZEALAND JOURNAL OF Agriculture

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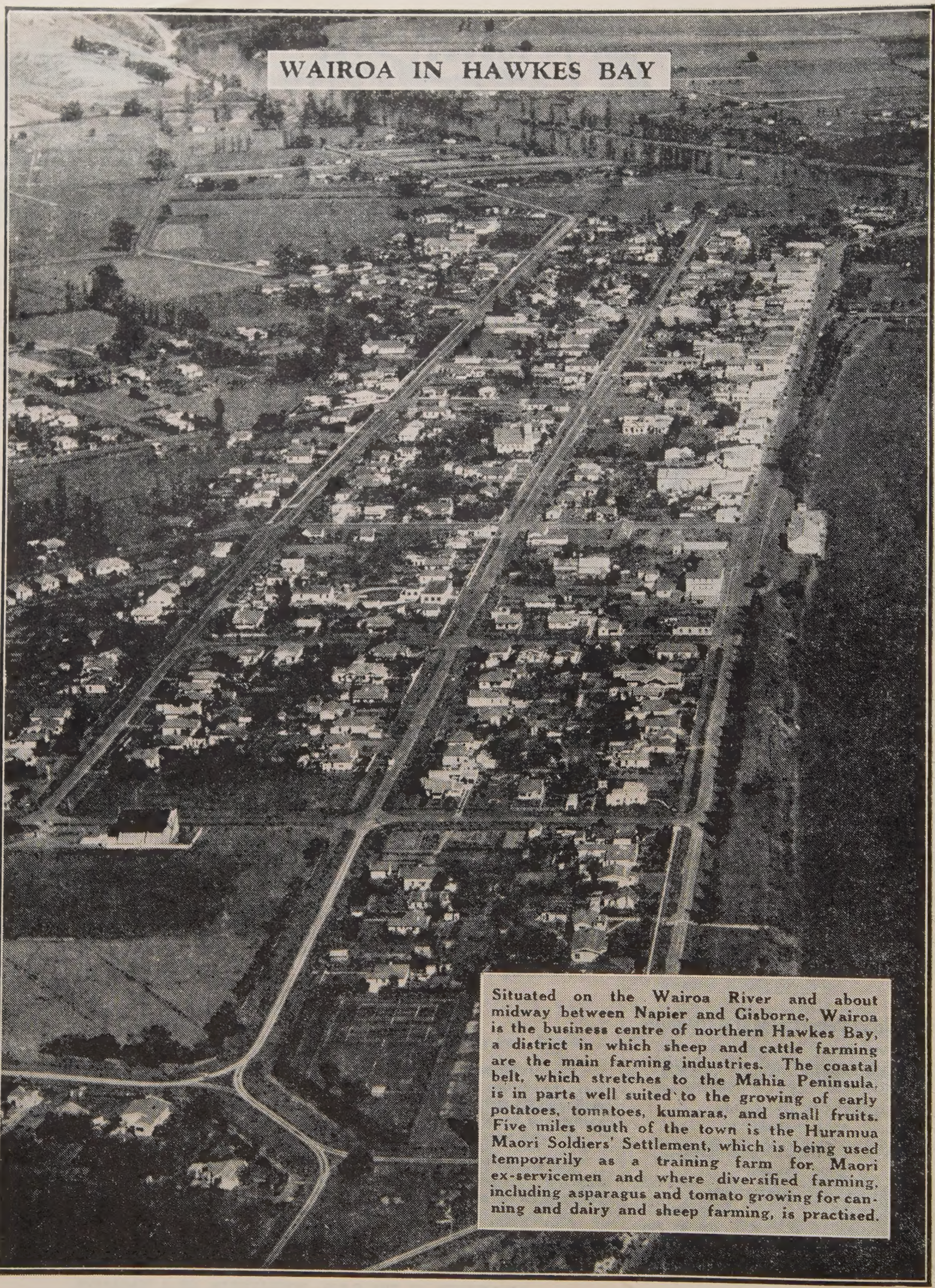
WAIROA IN HAWKES BAY



Situated on the Wairoa River and about midway between Napier and Gisborne, Wairoa is the business centre of northern Hawkes Bay, a district in which sheep and cattle farming are the main farming industries. The coastal belt, which stretches to the Mahia Peninsula, is in parts well suited to the growing of early potatoes, tomatoes, kumaras, and small fruits. Five miles south of the town is the Huramua Maori Soldiers' Settlement, which is being used temporarily as a training farm for Maori ex-servicemen and where diversified farming, including asparagus and tomato growing for canning and dairy and sheep farming, is practised.

[V. O. Browne photo.

An Appraisal of World Food Supplies for 1948-49

ONE of the objectives of the Food and Agriculture Organization of the United Nations is to establish by surveys, research, and the collection of statistical data and other information the proper dietary needs of the people of the world, and to provide all member nations at all times with a true and complete picture of the food situation in every land. In accordance with this aim FAO publishes such reports as "The State of Food and Agriculture," which I reviewed in the March issue of the "Journal," and from time to time appraisals of the world food situation. The most recent of these, entitled "World Food Appraisal as of April, 1949," has now been received in this country.

The general note of this appraisal is one of improvement in the over-all food situation and amelioration of supply conditions generally during 1948-49. The report states that though there are still insufficient data to express the improvement in terms of calories and nutrients, such developments as the discontinuance of international allocations of all foodstuffs except rice, the cessation of bread rationing and the curtailment of other rationing in most countries, and a fall in world prices of some staple commodities in themselves all point to an improvement in conditions.

Production Trends

The major part of the improvement is in grains and is the result of bumper 1948 harvests in North America, especially of wheat and maize, much heavier crops in Europe, and the fact that the Soviet Union is exporting cereals and may emerge as an important contributor to export trade.

The rice situation is not so happy, 1948-49 production being still about 3 million tons less than before the war, while total requirements are well above those of before the war because of the increase in the rice-eating population. The recovery in production of sugar has been so marked that the danger of an unmanageable world surplus may again become acute.

World production of oils and fats reached a total within 5 per cent. of the pre-war volume, but consumption per head was still 10 to 15 per cent. below the pre-war figure. The position with livestock products was somewhat similar, recovery in livestock numbers being hindered by cereal shortages and drought conditions in Europe in 1947. World meat production was still about 8 per cent. below the pre-war total. Even the United States of America became a net importer of meat in 1948, partly because of concentration on cereal production and increased meat consumption per head. Better supplies of coarse grains will result in considerable improvement in livestock production, though only after some time lag. In many war-devastated countries herds of cattle have not yet regained pre-war strength.

The report lays particular stress on the effects of the shortage of dollar exchange on food supplies in many countries. This applies particularly to fats and oils and to livestock products, because prices of these have remained high and food-importing countries in soft-currency areas have been concentrating on cereal production. Vital assistance has been given by Economic Co-operation Administration (Marshall) aid to Europe and China, "but," states the report, "international trade in foodstuffs is still restricted by the fact that a large part of the world's imports must come from dollar areas, while exports of machinery and consumable goods from food-deficit countries go mainly to sterling and soft-currency countries."

Long-term Factors

After reviewing each of the major regions separately, the food appraisal concludes with a brief statement on long-term trends, the main points of which are:—

1. Total world food production is approaching pre-war levels, but average consumption per head is still less than before the war, which was itself, for the majority of the world's people, grossly inadequate. Consumption per head has risen since before the war in countries where it was already high.
2. Exchange difficulties and wartime maladjustments are causing a re-orientation of trade in agricultural produce. Food production can be increased most easily in North America, from which region it is most difficult for the rest of the world to buy.
3. There is a strong tendency in Latin American countries and in parts of the Far East to place less reliance on the export of single commodities because of fear of price recessions and to attempt to diversify food production.
4. Many European countries are endeavouring to replace food imports by home-grown produce, often at extremely uneconomic levels.

The appraisal considers that these and other factors indicate that to bring about an improvement of the world food situation general trade policy needs to be reviewed not only in relation to the food supply of the country concerned, but also in relation to intra-regional and world trade.

Effect on New Zealand

The continuing shortage of livestock products and of oils and fats suggests that, quite apart from our undertakings to the British Government to increase exports of meat, butter, and cheese, New Zealand would be well advised to continue the policy of expanding the production of these commodities. There is no doubt that all we can export will find a ready market. Notable efforts have already been made during the past few years, but there is scope for much greater expansion.

EDWARD CULLEN, Minister of Agriculture.

CARE OF LIVESTOCK DURING NOVEMBER

Contributed by the Animal Research Division.

DRY EWES

IF dry ewes have not already been removed from the flock, they should be separated immediately. It is a good plan to shear them and during shearing they should be inspected carefully for udder abnormalities. All ewes whose udders were empty at lambing and ewes with diseased udders, damaged teats, very large teats, very small teats, or badly-placed teats should be culled. Dry ewes with defective mouths and old ewes which did not have a lamb this year should also be culled. Dry ewes which are retained should not be allowed to get too fat during the summer. If kept in hard store condition, they are more likely to hold when mated next autumn.

* * *

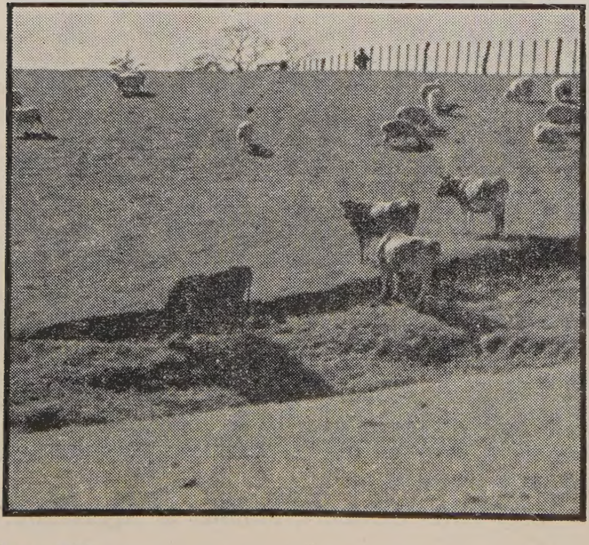
MATING OF DAIRY COWS

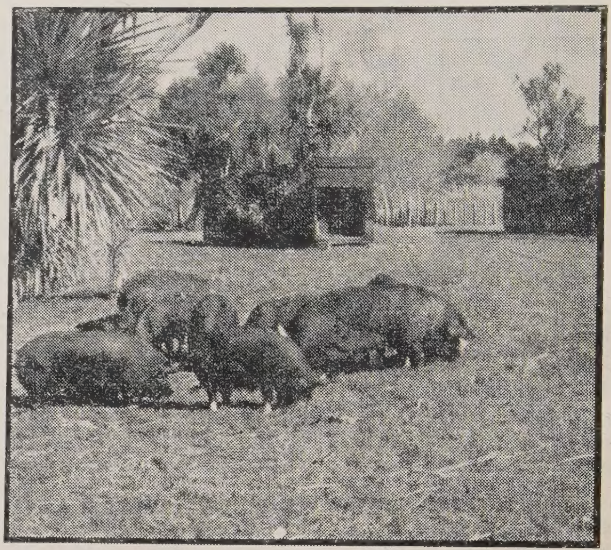
Cows should not be served within 30 days after calving, as conception rates are poor during this period. Hand mating should be practised, and accurate records should be kept showing the bull used and the dates of all services. This will enable calving dates to be forecast, and in the event of breeding troubles occurring will prove of great assistance in arriving at a correct diagnosis.

* * *

CONTROL OF FAT LAMB PASTURE

Pastures on which ewes and lambs are grazing should never be allowed to become rank. If pastures are getting too long, they can best be controlled by cattle. Yearling beef cattle soon become quiet and they can then be run with ewes and lambs even in small paddocks. If no cattle are available, it is better to add dry sheep than to increase the number of ewes and lambs.





[*National Publicity Studios photo.*

CARE OF PIGS

Dry sows should have access to good pasture, and in addition should receive from 2 to 4 gallons of milk per day, depending on their condition. They should be kept thriving but not allowed to become too fat. Keep only as many of the spring litters for baconers as can be fed adequately. The remainder should be sold as porkers.

* * *

VACCINATION AGAINST CONTAGIOUS ABORTION

Vaccination has been very successful in preventing contagious abortion. Over 200,000 heifers have been vaccinated in each of the last 2 years. There were, however, over 100,000 heifers which were not vaccinated. Past freedom from abortion is no excuse for not vaccinating, as infection may be introduced into a herd at any time. Although vaccination does not commence until January or February, vaccine should be ordered now, as Veterinarians and Inspectors of Stock have to plan their vaccination itineraries. Late orders make this planning very difficult.

* * *

POULTRY MITES AND LICE

The red mite of poultry feeds only at night and lives in cracks and crevices during the day. Perches should be sprayed or painted with creosote at 3-day intervals until no further mites are seen. Poultry lice can cause considerable loss of condition as well as reduction of egg laying. To control them choose a calm night and before the birds go to roost run a trickle of 40 per cent. nicotine sulphate along the perches. Two or three treatments should be given at weekly intervals.

Town Milk Grading

By T. P. J. TWOMEY, Superintendent of Market Milk Production, Department of Agriculture, Wellington.

FOR many years New Zealand dairy farmers supplying milk to cheese factories or cream to butter factories have enjoyed the benefits of milk and cream grading. With one or two local exceptions, no such benefits have been available to town milk producers and no over-all town milk grading scheme exists. That such a scheme is desired is proved by the number of occasions on which officers of the Department of Agriculture are asked when a grading scheme is to be introduced. This article deals with some of the more obvious problems associated with the introduction of such a scheme.

A TRADING system whereby town milk is sold on a straight-out gallonage basis presupposes that milk is a commodity of constant standard. Every milk producer and a majority of milk consumers know that, of all articles, town milk is least likely to be constant in composition or standard, but despite this, very few determined efforts have been made to introduce a system of paying for milk of high quality at a rate in excess of the rates for milk of poorer or inferior quality. This problem is, however, engaging the earnest attention of many of the leading countries in the British Commonwealth today and the next few years should see a considerable expansion in the introduction of town milk grading schemes.

One of the more obvious defects of a system under which town milk is traded on a gallonage basis is that the quality of the milk bought and sold tends to be depressed to a level corresponding with the appropriate minimum standards set by various health authorities. It is hard to blame the town milk producer when it is legal, and certainly more profitable, to produce 100 gallons of 3.3 per cent. milk instead of 80 gallons of 4.3 per cent. milk.

If the appropriate health regulations demand that milk contain not less than, say, 3.0 per cent. butterfat and 8.5 per cent non-fatty solids—as is the case in England—it is easy to realise that these minima tend to become the near-average standard. Though equivalent standards in New Zealand are 3.25 per cent. butterfat and 8.5 per cent. non-fatty solids, the town milk scheme, covering the financial organisation of the town milk industry, has taken some cognisance of this weakness by stipulating that town milk prices gazetted from time to time relate to milk containing 4.3 per cent. butterfat. However, even with this implied safeguard there is, in some areas, a noticeable trend toward the production of milk of a standard approaching the minimum legal standard rather than the specific standard implied in this scheme.

Justification for Scheme

A grading scheme can be justified both from the producer's and consumer's points of view, and both points of view are complementary. The producer's justification lies in the fact that on the basis of equity careful efforts should be more highly rewarded than casual efforts. The consumer's justification lies in the fact that the consumer finds the money to buy the product from the producer—and this is so even when the industry is subsidised, as it is in New Zealand today—and justifiably can demand the highest-quality article money will buy.

Producer's Viewpoint

As prices are arranged today the man who, at considerable expense, maintains a healthy, high-producing herd of dairy cows, who by considerable personal effort preserves the utmost cleanliness in his farm dairy, and who takes pains to see that his milk is delivered early and under hygienic conditions gets no more than the producer who does little more than transfer milk from his cows to the consumer with the least possible effort. The two extremes are not nearly as rare as might be imagined, though fortunately the majority of town milk producers in New Zealand tend toward the former extreme rather than to the latter. In terms of actual figures it is not uncommon to see two results of the same day's testing in a milk-treatment house laboratory reading as follows:—

	Producer A	Producer B
Butterfat ..	4.50 per cent.	3.30 per cent.
Non-fatty solids	9.25 per cent.	8.50 per cent.
Methylene blue test	8 hours	4 hours
Sediment test	Clean	Dirty
Palatability ..	Fresh and clean	Stale

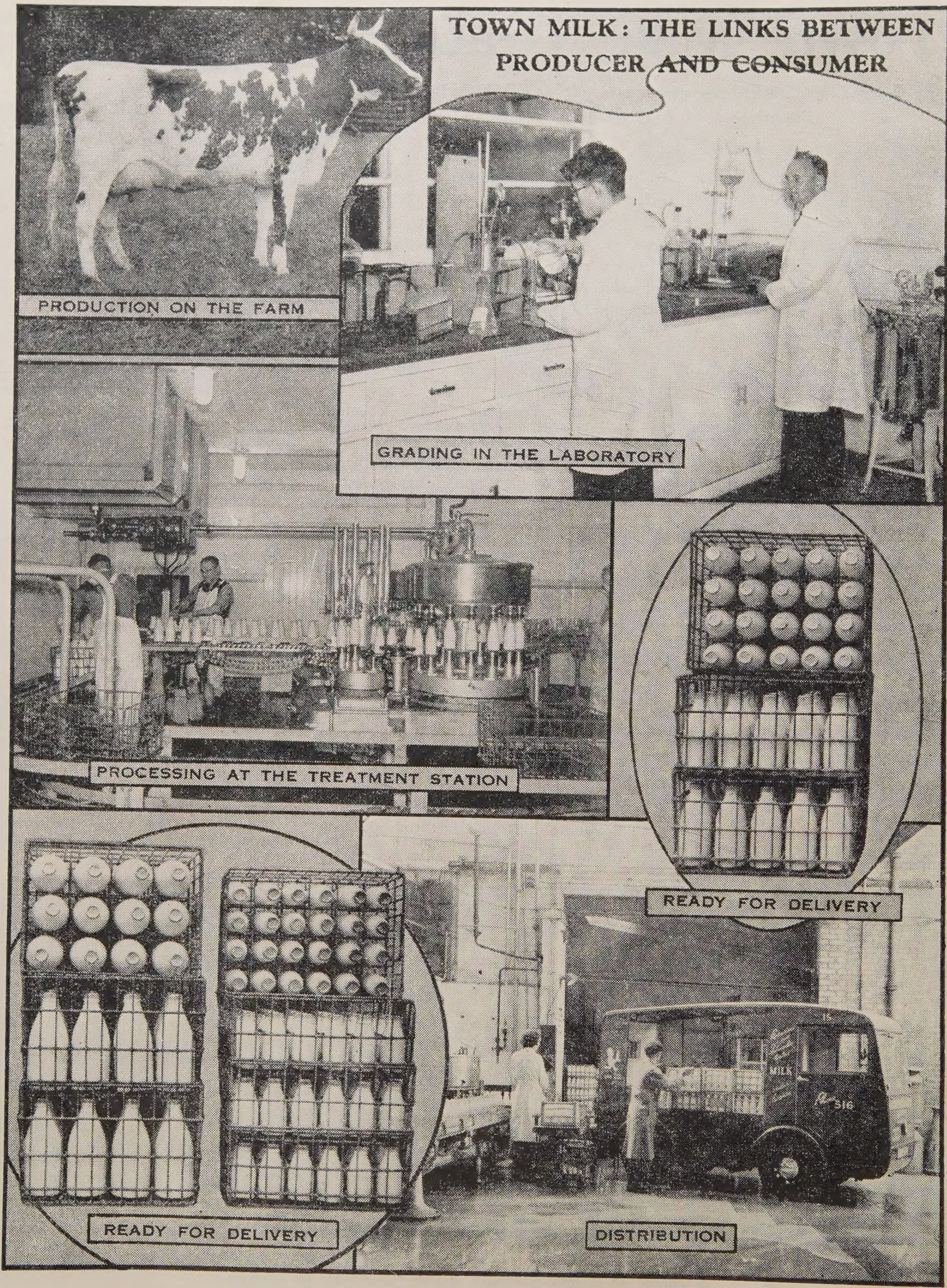
It is obviously not equitable that producer B should get for patently-inferior milk exactly the same price per gallon as producer A. Yet this in fact does happen under existing conditions.

The Consumer's Viewpoint

Assuming that the milk from these two hypothetical producers is delivered to a consumer, it will readily be appreciated that if the customer purchases producer A's milk today and producer B's milk tomorrow, the 7d. paid for a quart will purchase considerably less nourishment tomorrow than it will today. Yet the housewife expects that the quart of milk which she will give her family tomorrow will be as nourishing as today's quart. Obviously in the example given this will not be the case and yet both milks conform with present minimum legal standards.

[*Jack Welsh and Sons photo.*

A corner of a milk-treatment station laboratory in Dunedin.



TOWN MILK: THE LINKS BETWEEN PRODUCER AND CONSUMER

PRODUCTION ON THE FARM

GRADING IN THE LABORATORY

PROCESSING AT THE TREATMENT STATION

READY FOR DELIVERY

READY FOR DELIVERY

DISTRIBUTION

[Photograph at middle left by Jack Welsh and Sons.

As the consumer's goodwill is one of the ultimate factors deciding whether town milk production is profitable or not, it is obviously in the interests of the producer to supply not only a milk of a reasonably consistent standard, but a milk of a consistently high standard. Town milk grading would help the producer to achieve this by rewarding the attainment of a high standard with a higher financial gain.

What Qualities Should be Graded?

To say that the customer can justifiably demand milk of a uniformly high standard presupposes the establishment of such a standard. The next point, therefore, is to determine what qualities in milk should be deemed desirable and for which there should be standards.

There are at least three qualities which obviously will have to be incorporated in any milk grading scheme. They are:—

Butterfat content.
Non-fatty solids content.
Keeping quality, as expressed by the methylene blue test.

Tests for these three qualities are specifically named in current health regulations, which make it illegal to sell milk having tests below certain minima in the three categories mentioned. To comply with the Food and Drug Regulations, 1946, milk must contain not less than 3.25 per cent butterfat, 8.5 per cent. non-fatty solids, and give a reading of not less than 4 hours on the methylene blue reduction test at the **point of delivery to the ultimate customer.**

Broadly, it can be stated that the butterfat content and the non-fatty solids content, which together make up the total solids content of the milk, are a direct measure of the nourishment content of milk. The methylene blue reduction time can be said to represent the keeping quality, and, by implication, the degree of cleanliness of the milk.

In addition to the qualities for which legal standards exist, the consumer can justifiably expect a good degree of palatability and a complete absence of sediment in milk. Palatability is important, as consumption will never be encouraged unless milk tastes clean and fresh and is consistently free of off-taints or off-flavours. Good milk producers make a point of straining all milk carefully and, if this is done properly and the milk protected satisfactorily thereafter, there should be no signs of sediment when the customer eventually pours out a glass of milk.

What the consumer can justifiably expect, therefore, is a milk of high-nourishment content and good keeping quality and which is palatable and obviously clean. Fortunately, the tests available for checking these qualities are simple and widely known.

Butterfat Content

In New Zealand today the butterfat content of milk is normally measured by means of the Babcock or the Gerber test, the Babcock test being more widely used at present. Both tests work on the principle of the centrifugal separation of the butterfat from the other constituents of the milk and the tests are rapid and reliable. The Babcock test, in particular, has been employed in butter and cheese factories for many years and the test has been used in New Zealand in connection with the payment for milk and cream on a butterfat basis for almost half a century.

Non-fatty Solids Content

Milk is composed of fat, carbohydrate, protein, and water. Non-fatty solids are the constituents other than fat and water and are composed mainly of carbohydrate and protein, the milk sugar being the carbohydrate and the casein and albumen the protein. Though the specific gravity of milk varies according to the variation in the constituents forming the total solids of the milk, the relationship between the fat and the non-fatty solids is reasonably constant and this ratio is itself constant in relation to the specific gravity of the milk. Therefore, a measurement of the specific gravity and the fat content of the milk readily enables the non-fatty solids content to be calculated accurately and this is the system commonly adopted for a quick estimation of the non-fatty solids.

Keeping Quality

All milk commercially produced contains bacteria in varying numbers, including a high proportion of bacteria of a type which rapidly converts the lactose (milk sugar) in the milk into lactic acid. It is this acid development which so readily causes milk to go sour. It is obvious that the more bacteria the milk contains the quicker the milk will go sour and the methylene blue reduction test is based on this fact. It measures indirectly the bacterial life in the milk by showing how long it takes for the bacteria in a given sample of milk to decolorise a specific quantity of an organic dye called methylene blue. A full description of the operation and application of this test was given in an article by S. J. Cowen, Market Milk Instructor, Department of Agriculture, Palmerston North, in the September issue of the "Journal."

Palatability

Palatability can be termed a senses test; that is, it is a measure of the effect on the palate and on the nose of a sample of the milk. Obviously, to be palatable, milk should taste clean and fresh and should have no off-flavour and no off-taint. Chemical or bacteriological tests are not necessary to assess palatability, nor are they, in practice, used for this purpose. Taste and smell are still the best means of measuring palatability.

Sediment

The amount of sediment or visible dirt in a sample of milk is measured accurately by drawing a specific quantity of milk through a filter pad of predetermined size and composition. The filter pad shows clearly the amount of dirt which may have been held in suspension in the milk. The test is efficient and simple and is widely used.

All five tests described are easily performed and well within the scope of even a very slightly trained dairyman. Already milk-treatment stations which have laboratories carry out the tests on the milk received from each producer as a matter of routine. The incorporation of the tests into a town milk grading scheme, therefore, would offer little difficulty either from the technical or the control point of view.

Frequency of Testing

As the town milk scheme in New Zealand already operates on a monthly payment basis, it is obvious that any grading scheme should also be operated on a monthly basis, but the question of frequency of testing within each period then arises.

Butterfat testing as practised in cheese and butter factories necessitates daily sampling of producers' milk; these samples are kept from day to day and are tested at 10-day intervals. To prevent decomposition the samples are chemically preserved, but this has no effect on the test carried out on the composite samples. It is felt that a similar composite sampling system should be operated in a town milk grading scheme. Such a system, therefore, presupposes daily sampling and tri-monthly testing.

Non-fatty solids testing, though easily carried out, would be rather difficult to perform on a daily basis. However, as the non-fatty solids content in average milks does not fluctuate widely from week to week, it is felt that, provided a minimum of samples—say, three—were taken each month, compulsory testing need not be more frequent, but graders wishing to test the non-fatty solids more often would be at liberty to do so without disorganising a grading scheme. The non-fatty solids test would not be carried out on composite samples, as with the butterfat test, but would be done on at least any 3 days of the month, at the grader's discretion.

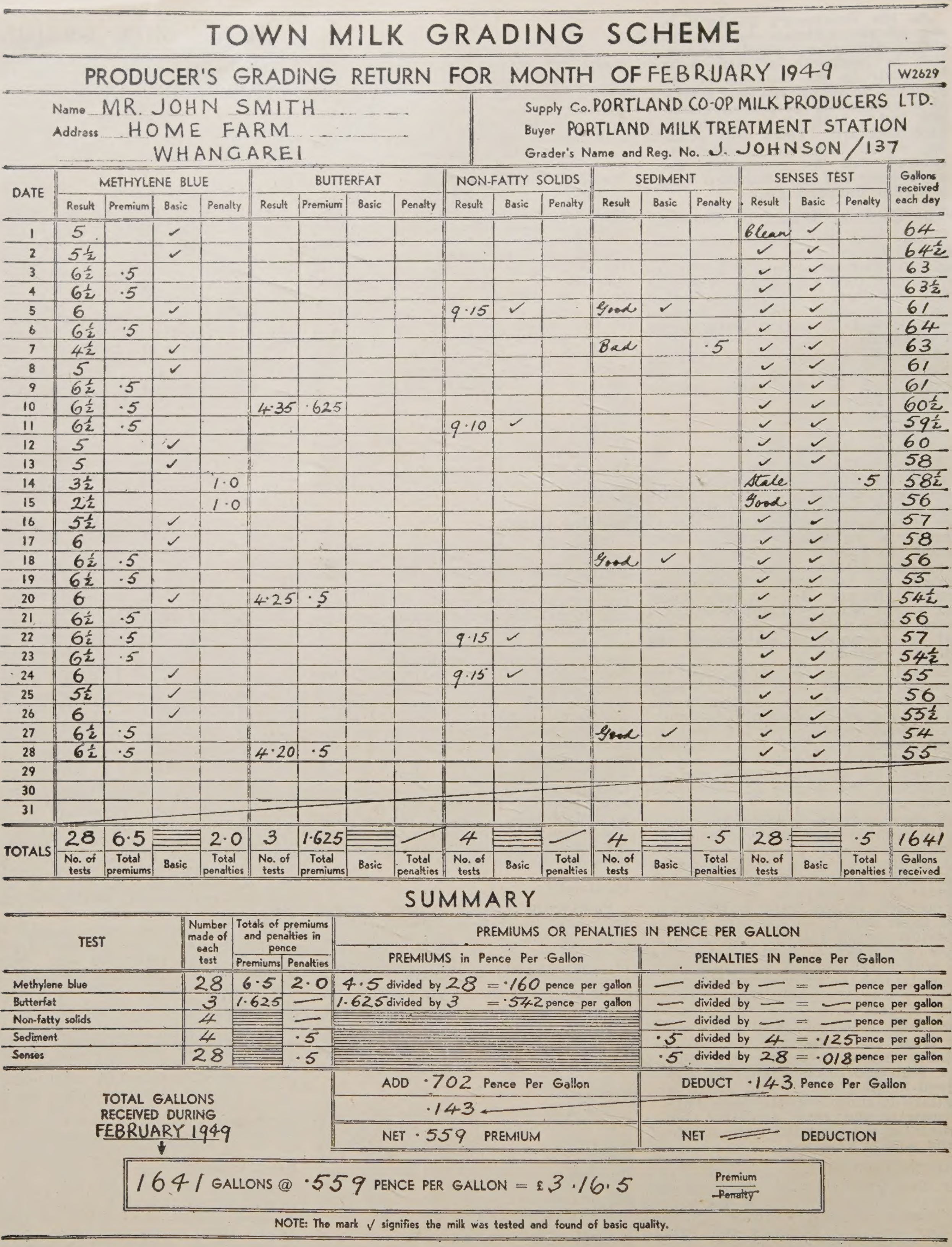
The methylene blue test should be carried out on samples of each day's milk, which would avoid any conflict with established grading routines as already practised in cheese factories and dried-milk plants. A technique would, of course, have to be formulated to standardise sampling and testing routines in the methylene blue test.

The palatability test should be applied to every consignment of milk and, as most producers are aware, almost all consignments received by distributors (dairymen or milk treatment stations) are already tested for palatability.

What has been said about sediment testing applies in the main to non-fatty solids testing and, in practice, a minimum of three tests a month would meet normal requirements, though, again, a greater frequency of testing could be maintained without upsetting the operation of the scheme.

Basic Grades

Before a decision can be made as to who should test milk for town milk grading, the problem arises of establishing basic grades, premium grades, and sub-basic grades. It is probably a question of considering each test and deciding what results should be encouraged and what results should be discouraged.



TOWN MILK GRADING SCHEME

PRODUCER'S GRADING RETURN FOR MONTH OF FEBRUARY 1949

W2629

Name MR. JOHN SMITH
Address HOME FARM
WHANGAREI

Supply Co. PORTLAND CO-OP MILK PRODUCERS LTD.
Buyer PORTLAND MILK TREATMENT STATION
Grader's Name and Reg. No. J. JOHNSON /137

DATE	METHYLENE BLUE				BUTTERFAT				NON-FATTY SOLIDS			SEDIMENT			SENSES TEST			Gallons received each day
	Result	Premium	Basic	Penalty	Result	Premium	Basic	Penalty	Result	Basic	Penalty	Result	Basic	Penalty	Result	Basic	Penalty	
1	5		✓												Clean	✓		64
2	5½		✓												✓	✓		64½
3	6½	·5													✓	✓		63
4	6½	·5													✓	✓		63½
5	6		✓						9·15	✓		Good	✓		✓	✓		61
6	6½	·5													✓	✓		64
7	4½		✓									Bad		·5	✓	✓		63
8	5		✓												✓	✓		61
9	6½	·5													✓	✓		61
10	6½	·5			4·35	·625									✓	✓		60½
11	6½	·5							9·10	✓					✓	✓		59½
12	5		✓												✓	✓		60
13	5		✓												✓	✓		58
14	3½			1·0											Stale		·5	58½
15	2½			1·0											Good	✓		56
16	5½		✓												✓	✓		57
17	6		✓												✓	✓		58
18	6½	·5										Good	✓		✓	✓		56
19	6½	·5													✓	✓		55
20	6		✓		4·25	·5									✓	✓		54½
21	6½	·5													✓	✓		56
22	6½	·5							9·15	✓					✓	✓		57
23	6½	·5													✓	✓		54½
24	6		✓						9·15	✓					✓	✓		55
25	5½		✓												✓	✓		56
26	6		✓												✓	✓		55½
27	6½	·5										Good	✓		✓	✓		54
28	6½	·5			4·20	·5									✓	✓		55
29																		
30																		
31																		
TOTALS	28	6·5		2·0	3	1·625		—	4		—	4		·5	28		·5	1641
	No. of tests	Total premiums	Basic	Total penalties	No. of tests	Total premiums	Basic	Total penalties	No. of tests	Basic	Total penalties	No. of tests	Basic	Total penalties	No. of tests	Basic	Total penalties	Gallons received

SUMMARY

TEST	Number made of each test	Totals of premiums and penalties in pence		PREMIUMS OR PENALTIES IN PENCE PER GALLON	
		Premiums	Penalties	PREMIUMS in Pence Per Gallon	PENALTIES IN Pence Per Gallon
Methylene blue	28	6·5	2·0	4·5 divided by 28 = ·160 pence per gallon	— divided by — = — pence per gallon
Butterfat	3	1·625	—	1·625 divided by 3 = ·542 pence per gallon	— divided by — = — pence per gallon
Non-fatty solids	4		—		— divided by — = — pence per gallon
Sediment	4		·5		·5 divided by 4 = ·125 pence per gallon
Senses	28		·5		·5 divided by 28 = ·018 pence per gallon

TOTAL GALLONS RECEIVED DURING FEBRUARY 1949
↓

ADD ·702 Pence Per Gallon
·143
NET ·559 PREMIUM

DEDUCT ·143 Pence Per Gallon
NET — DEDUCTION

1641 GALLONS @ ·559 PENCE PER GALLON = £3 ·16· 5 Premium ~~Penalty~~

NOTE: The mark √ signifies the milk was tested and found of basic quality.

A suggested form for a monthly grading return. The original of this form, duly completed by the certificated grader, could be forwarded to the individual producer and a copy sent to his supply association, who could then undertake the necessary claim on his behalf. The price differentials shown are solely for illustration and must not be construed otherwise.

Grades for Butterfat Content

The present town milk scheme takes cognisance of the fact that, on the average, the butterfat content of milk in New Zealand (about 4.30 per cent.) is generally well above the legal minimum of 3.25 per cent. It could be suggested that a milk of this 4.30 per cent. standard should be nominated as a basic-grade milk, but if this were done, it might tend to raise the premium grade too high and leave too big a gap between the 3.25 per cent. minimum and the 4.30 per cent. basic test.

On this question of butterfat content of milk for liquid consumption it is interesting to note that most nutritionists hesitate to recommend milk with a very high fat content as being ideal for human consumption. Rich milk by no means agrees with everybody, and overseas there is a marked tendency for milk of very high fat content to be reduced in fat content before it is sold for human consumption. Authorities on milk standards contend that 4 per cent. butterfat milk is probably best suited to present-day needs. However, for New Zealanders, who are used to a high butterfat intake, this figure might be a shade low and, perhaps, a basic grade for butterfat ranging from 3.80 per cent. to 4.30 per cent. could be established.

Alternatively, it could be argued that, as the 3.80-4.30 per cent. range gives the consumer more butterfat than the law requires, this range should constitute a premium grade and the basic grade should be established nearer the 3.50 per cent. mark. This reasoning is sound and there is much to support the adoption of the standard it seeks to establish. If it were adopted, it would be necessary to establish a further premium range beyond 4.30 per cent. and, by implication, to establish a penalty grade below 3.50 per cent.; no milk producer concerned with the welfare of the town milk industry could dispute the latter provision. However, the question of setting a premium range beyond 4.30 per cent. is not quite so simple because, unless such a premium was moderate, there might be a tendency to encourage the production of milk having an extra-high fat content and this would be of little benefit to the consumer.

If the basic grade were established within the range of 3.50 per cent. to 4.00 per cent. and premiums of ½d. per gallon for milk between 4.05 per cent. and 4.30 per cent. fat and ⅝d. for all milk above 4.30 per cent. were paid, the financial inducements involved would tend to standardise the butterfat content at between 4.00 per cent. and about 4.50 per cent. Generally, this would meet with the approval of many nutritionists and consumers.

It might be argued that the penalty for milk below 3.50 per cent butterfat should be fairly severe; the present price structure already implies that milk of a test of 4.30 per cent. is of fair quality for the town milk price granted. On the basis of a premium of ⅝d. for milk of more than 4.30 per cent. butterfat, penalties of ½d. per gallon on milk between 3.25 per cent. and 3.45 per cent. and 1½d. per gallon on milk below the legal standard of 3.25 per cent. would not appear to be unduly harsh.

Non-fatty Solids Grade

The percentage of non-fatty solids in milk, the legal minimum for which is 8.50 per cent., bears a ratio to the percentage of fat in milk. Generally, therefore, efforts on the part of a milk producer to improve the fat content will usually improve the non-fatty solids content. The legal standard is easily maintained by most milk producers in New Zealand and it would appear to be unreasonable to establish a premium range or a premium grade for the non-fatty solids content in milk. However, some degree of penalty would appear to be justified when milk containing less than the legal minimum of 8.50 per cent. is sold. When such milk is sold the customer is definitely not getting fair value and, moreover, a test below 8.50 per cent. often denotes the presence of "added water" or similar adulteration.

Taking into account the butterfat-content standards suggested, it could be assumed that a basic-grade milk should contain not less than 8.50 per cent. non-fatty solids; for milk below this figure a penalty of ½d. per gallon would not be unfair. There would be no justification for a premium grade.

Methylene Blue Reduction Test

It is legally obligatory for milk subjected to the methylene blue test to give a reading of not less than 4 hours. At the same time a reading of 4 hours does not denote a high-standard milk and in several countries a 4-hour test is considered rejection standard. As a minimum, milk giving a result of less than 6 hours but greater than 4 hours can be considered of fair quality, while milk giving a result of more than 6 hours can be considered of good quality. It will be appreciated that the grades at best can be only arbitrary, but for practical purposes in New Zealand today methylene blue tests could place milk in one of three grades: Poor quality (penalty), a reading of under 4 hours; fair quality (basic), a reading of 4 hours to 6 hours inclusive; and good quality (premium), a reading of more than 6 hours.

As with the fat-content grades, an extra ½d. per gallon seems adequate for premium grade under the methylene blue test, and the position in relation to the methylene blue result below 4 hours is much the same as with the fat content below 3.25 per cent., so that, if the premium payment under the methylene blue test is ½d. per gallon, the penalty could justifiably be 1d. per gallon.

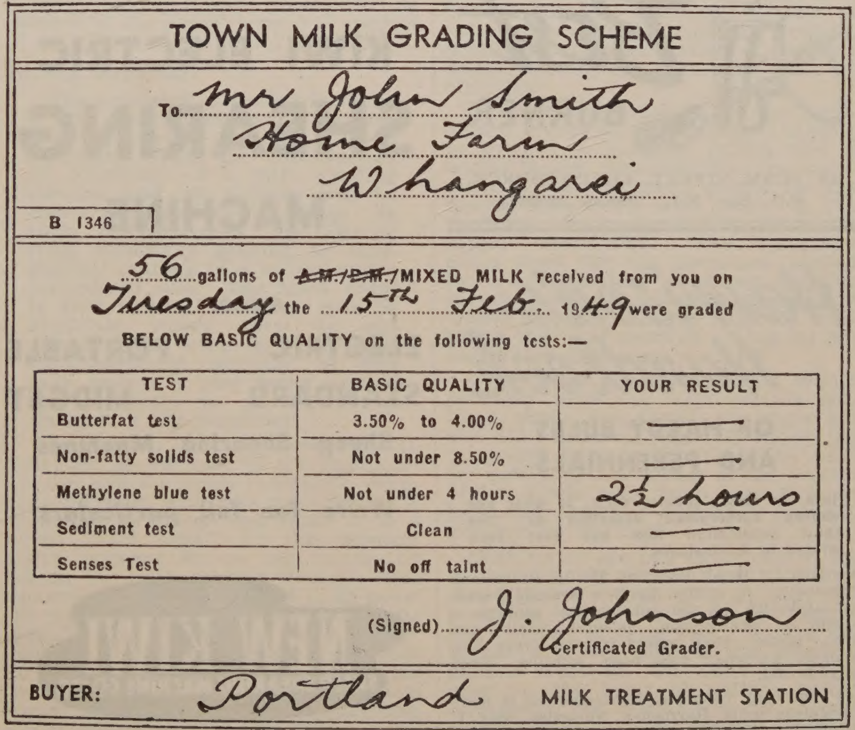
Palatability

Milk should taste clean and sweet, and if it does not, it is not of a standard to warrant the basic price. In essence, this means that milk, as far as palatability tests are concerned, would be either basic grade or penalty grade. There could not be a premium grade.

Sediment Test

Under a sediment test, too, milk can be of only two grades—good or bad, that is, clean or dirty. Milk if clean should be assumed to be of basic grade; if dirty, below basic grade and therefore within the penalty category.

For both palatability and sediment, probably a ½d. per gallon penalty would be reasonable and would place these tests on a par with the non-fatty solids test.



TOWN MILK GRADING SCHEME

To Mr John Smith
Home Farm
Whangarei

B 1346

56 gallons of ~~A.M./P.M./~~MIXED MILK received from you on
Tuesday the 15th Feb 1949 were graded
BELOW BASIC QUALITY on the following tests:—

TEST	BASIC QUALITY	YOUR RESULT
Butterfat test	3.50% to 4.00%	—
Non-fatty solids test	Not under 8.50%	—
Methylene blue test	Not under 4 hours	2½ hours
Sediment test	Clean	—
Senses Test	No off taint	—

(Signed) J. Johnson
Certificated Grader.

BUYER: Portland MILK TREATMENT STATION

A suggested form which could be used for notifying a producer when his milk falls below basic grade, that is, below standard.

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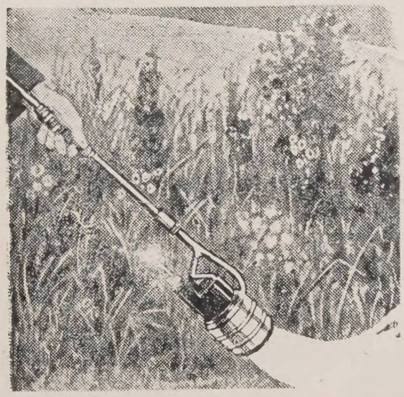
EFFICIENT !



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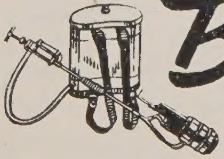

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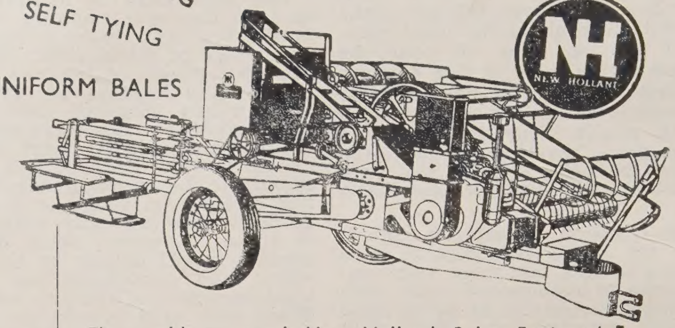

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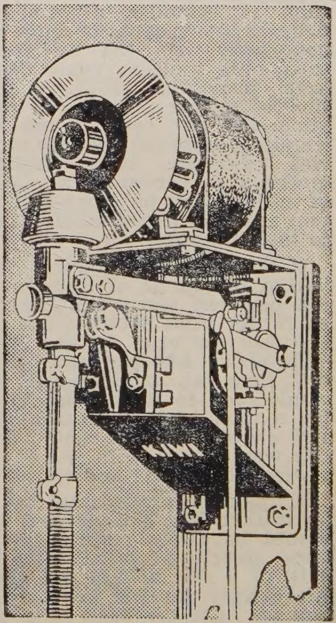

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90 FEDERAL STREET - - AUCKLAND

It should be borne in mind that the various prices per gallon given are purely for illustrative purposes and should not be construed as representing either the firm opinions or recommendations of any organisation.

When presented in tabular form the points already considered show the position as follows:—

Test	Result of test	Price differential per gallon
Methylene blue (in hours)	Over 6 hours	Add ½d.
	4 hours to 6 hours inclusive	Basic price
	Under 4 hours (i.e., under legal standard)	Deduct 1d. if accepted
Butterfat	Per cent.	
	Over 4.30	Add ⅝d.
	4.05 to 4.30	Add ½d.
	3.50 to 4.00	Basic price
	3.25 to 3.45	Deduct ½d.
	Under 3.25 (i.e., under legal standard)	Deduct 1½d. if accepted
Non-fatty solids	Per cent.	
	8.50 and over	Basic price
	Under 8.50 (i.e., under legal standard)	Deduct ½d. if accepted
Sediment	Satisfactory	Basic price
	Unsatisfactory	Deduct ½d.
Palatability	Satisfactory	Basic price
	Unsatisfactory	Deduct ½d.

Who Should Test?

At present in New Zealand town milk producers sell to milk-treatment stations through their co-operatively-owned producer supply companies. The treatment stations which buy the milk are publicly, co-operatively, privately, or Government owned. That rather complicates the position as far as grading officials are concerned.

In butter and cheese factories a specially-trained member of the staff is appointed as a milk or cream grader. He is not permitted to act unless he has a grader's certificate, which is issued by the Director of the Dairy Division of the Department of Agriculture. The organisation and maintenance of proper grading at dairy factories is thus controlled by officers of the Dairy Division also, as it is obvious that if a grader holds his certificate at the pleasure of the Dairy Division, it is essential for him to comply with the current regulations of the Division. These regulations ensure absolute impartiality between buyer and seller.

The grading position in the case of butter and cheese factories is simplified somewhat because such factories are co-operatively owned by the producers sending milk or cream to them and, therefore, milk or cream is graded by an employee of the producers. Milk-treatment stations and dairymen's businesses, however, in most instances are not co-operatively owned by milk producers, so that graders under a town milk grading scheme, if employees of such stations or businesses, would not be employees of the milk producers. However, as under the town milk scheme there no longer exists any financial temptation to down grade producers' milk and thus pay a lower price—as for second-grade milk—the disadvantages associated with using milk-treatment station employees as graders are largely removed. Furthermore, the interests of milk producers are completely safeguarded if, as suggested, employees acting as graders possess a certificate issued by the Dairy Division, as the Division's officers are competent to check and otherwise supervise the work of graders.

In some cases there may be a desire on the part of producers' supply companies to appoint and pay milk graders who, though employees of such companies, would carry out their duties in milk-treatment stations. However, as such employees' wages would be paid by producers, with little tangible gain to the latter, the position would appear to be quite adequately covered by the certification of milk-treatment station employees as milk graders on terms similar to those on which employees are certificated by the Dairy Division for grading duties in butter or cheese factories.

The fact that a milk grader might be the owner of a milk-treatment station, as in the case of a small-town dairy handling milk from perhaps two or three producers, would not necessarily complicate the position. Such a person's testing routine would still be subject to the supervision and control of an officer of the Dairy Division.

Testing Facilities

The provision of testing facilities is now proceeding apace in most milk-treatment stations, apart altogether from the introduction or otherwise of a milk grading scheme, and all stations will be encouraged to adopt testing. In such circumstances the change from voluntary grading to compulsory grading is a logical and a convenient step. The main point is that testing facilities will be available where they do not already exist, even in quite small milk-treatment stations; in fact milk testing is now being carried out regularly in all but three stations in the Dominion.

The position is much more difficult, however, in the case of the producer-vendor and the small individual vending dairyman who may purchase milk from one producer and retail it in a small rural area. At the moment there appears to be no means by which the milk passing through such channels could be included in an overall milk grading scheme. It may be possible to incorporate in a major scheme a modified scheme applicable to these producers, making use of the results from samples normally taken under the Food and Drug Regulations.

For the purpose of this article, however, it has to be assumed that references to a milk grading scheme apply exclusively to milk at present passing through milk-treatment stations and under the control of the Dairy Division and generally within the purview of the Dairy (Milk Treatment) Regulations, 1946.

Practical Operation

There are no substantial technical difficulties to be faced in operating a milk grading scheme utilising the five basic tests described. The financial organisation of the scheme would require serious consideration by the various interests involved, but it would appear vital that the payment of premiums and the deduction of penalties should both be incorporated in the wider town milk scheme. The advantages are obvious, one of them being that the Marketing Department, already charged with the operation of the town milk scheme, would be able automatically to control the operation of the financial side of the grading scheme. Another advantage is that the present monthly return rendered by producers' supply companies and the milk-treatment stations could readily incorporate the necessary claims for premium payments; this arrangement would have the added advantage that it definitely removes any temptation on the part of the milk-treatment station to seek immediate financial benefit from any down grading of an individual producer's supply—a most important point.

Assuming that a grading scheme as outlined was instituted, it would appear desirable that producers should be advised of their grading results either daily or at least on each occasion on which their milk incurred a penalty, that is, was below basic grade. Under normal circumstances it is probable that the latter system of notification would suffice, though, possibly, daily notification of keeping quality (methylene blue test) could be arranged.

It would be necessary for the certificated grader at the treatment station to compile a monthly return and it would appear desirable that the statement of the producer's grades for the month should be sent direct to the producer and a copy forwarded to his supply association. The statement could show the net premiums earned by the individual producer for the month and the supply association would be able to use its copy for compiling the total monthly claims on behalf of its members.

Two types of forms which would probably meet the requirements outlined above are shown on pages 312 and 313. That on page 313 shows the suggested form which could be used for notifying a producer of the receipt of low-grade milk from him; that on page 312 shows a suggested monthly grading return form.

Both forms are self explanatory, but in the monthly return form it will be noted that the total of premiums and penalties (if any) are averaged against the number of tests taken during the month and not against the total of gallons received. To work out averages on the basis of gallons would complicate the working of the scheme substantially, without apparent benefit to the producers.

It is not intended that milk rejected on the reception stage of the treatment station should be entered on the grading sheet. This proviso would ensure that no producer would be penalised over his whole consignment because it contained one very bad can of milk. Whether or not milk was rejected would be at the grader's discretion.

In the summary section of the monthly return form the premiums earned or the penalties incurred over the whole month's grading are set out, and it is so arranged that the net cash gain to the producer for the month can be shown on this same return. This means that the producer would not be concerned unduly with a large number of forms. As his supply association would be responsible for making the necessary claims for the amount shown on his monthly return from the central fund the producer would not have to complete any forms or make any claims himself.

Summary of Suggested Scheme

It would appear practicable to introduce a town milk grading scheme in New Zealand. Such a scheme could be operated in conjunction with the present town milk scheme and premiums could be arranged by negotiation between town milk producers and the Government department responsible for the operation of the scheme. Premiums, once negotiated, could be the subject of appropriate regulations.

Grading should include tests for fat content, non-fatty solids content, keeping quality (methylene blue), sediment content, and palatabilty. The scheme could be operated by graders who would be certificated by the Director of the Dairy Division in the same manner as are graders in butter and cheese factories. At present there appears to be nothing undesirable about the use of certificated graders who may be employees of milk-treatment stations; alternatively, the certificated graders could be employees of milk supply companies supplying treatment stations.

The grading tests are already within the scope of any milk-treatment station in New Zealand, and the equipment needed to do the tests is reasonably simple and cheap to procure.

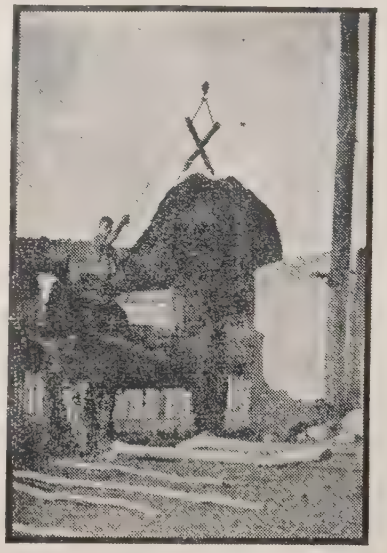
Producers could be notified on each occasion on which their milk fell below standard in any given test and daily notification could be arranged of the result of the keeping-quality test. A monthly grading return could be compiled by the certificated grader and forwarded direct to the producer concerned, with a copy to the appropriate supply company.

A scheme as outlined could be instituted on a date to conform with the beginning of any milk year as operated now under the town milk scheme.

It would appear obvious that only the bad producer would resent the introduction of a grading scheme. The good producer would welcome it, as it would be of immediate financial benefit to him. The producer between the extremes would also benefit, as the system would induce him to make every effort to raise the quality of his milk from basic to premium grade.

Silage Lifter Eases Work of Feeding Out

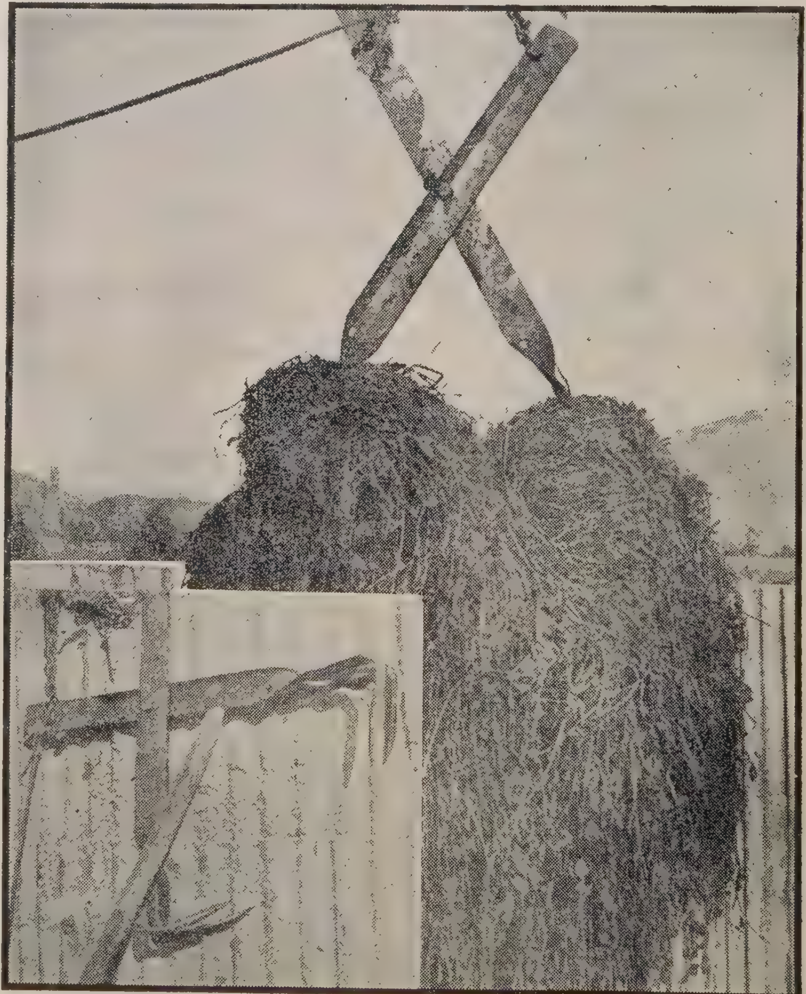
By D. M. E. MERRY,
Instructor in Agriculture,
Department of Agriculture, Nelson.



Loading silage with the tongs.

A LABORIOUS task connected with the feeding out of silage from stack, silo, or pit is the cutting or digging out of the ensiled material and the loading of it on to the sledge or truck from which it is distributed. To ease this work Mr. A. Randall in the Mararewa district, Nelson, has devised a simple set of tongs which are used with a stacking mast and boom to load out large quantities of silage in a short time with very little effort. A horse or tractor is used to elevate the load and a 1-horse load can be got in 5 minutes or less.

The tongs were made from used grader irons, but many other scrap steel bars could be adapted to the same purpose. The illustrations show the large loads which the tongs are capable of gathering and that hand cutting or lifting is completely eliminated.



FRUIT GROWING IN THE WAIKATO

Management Practices on Old-Established Orchard

By I. L. BROWN, Orchard Instructor,
Department of Agriculture, Hamilton.

DURING the past 30 years the Waikato district has become noted for its increased fertility and increasing production of dairy produce. The increasing productivity has been reflected in closer settlement and greater population, and a comparison of the population figures for 1916 and 1946 illustrates the rapid progress made. The 1916 census gave the population of Hamilton Borough and the surrounding counties of Waikato, Waipa, Piako, and Raglan as 5677, 8099, 5013, 6864, and 4027 respectively; the corresponding figures for 1946 were Hamilton 26,401, Waikato County 14,321, Waipa County 14,658, Piako County 10,939, and Raglan County 10,617. Commercial fruit growing in the Waikato has been only on a very minor scale, but the results achieved indicate conclusively that fruit growing can be a very successful form of farming there, as both climate and soil are suitable.

BEFORE 1915 there were barely 30 acres planted in commercial orchard and production was not high. During the past 30 years the area has more than doubled and there has been a substantial increase in the quantity of fruit produced, due to better management practices. Much of the original orchard area is now being used for housing.

Representative of the orchards established in the Waikato is that of Mr. W. J. McMiken, of Hamilton. This orchard, the first part of which was planted in 1914 by Mr. McMiken, assisted by his father, has progressed with the district until today it is a most productive unit in an area noted for high production.

Mr. McMiken was attending the Ruakura Farm of Instruction (now the Ruakura Animal Research Station) as a cadet in the horticultural section when the opportunity to obtain a property suitable for fruit growing occurred. The area selected for what in those days was considered a most doubtful undertaking consisted of 19 acres of pasture situated on Silverdale Road, 3 miles from the centre of Hamilton. There were no buildings, hedges, or drains on the property other than boundary ditches. Initial preparations for the establishment of the orchard therefore included not only preparation of the soil, but also the establishment of shelter, drainage, and the minimum requirements in buildings.

Shelter and Drainage

Wattles and pines were planted along the headlands to form temporary shelter while the permanent hedges of *Cupressus lawsoniana* were being established. In this first year also an extensive system of field tile drains was laid. These drains laid 30 years ago are still functioning perfectly and have never required attention. The buildings erected consisted of a small bach and a small lean-to style shed. The initial orchard planting was 8 acres of apples, pears, peaches, nectarines, and plums, the biggest proportion being apples.

Progress of this planting was reported in the May, 1921, issue of "The New Zealand Journal of Agriculture" by L. Paynter, then Orchard Instructor, Department of Agriculture, Hamilton, who, after commenting on the progress made by the trees, stated: "The orchard has been a profitable undertaking—probably there are few that have given such good returns. . . . " He then referred to a phase of management which has been continued throughout the years: "The practice of growing root crops between the trees is an excellent one. The ground is profitably used

HEADING PHOTOGRAPH: Spring cultivation work in progress in Mr. McMiken's orchard.

HIGHLY PRODUCTIVE WAIKATO ORCHARD

Upper left—Mr. McMiken's fruit display at the Waikato winter show. Upper right—Peach block in bloom. At right—Peach tree 3 years from planting. Lower left—Ballarat apple tree which has carried more than 30 bushels of fruit in a season. Lower right—An inter-row crop of maize.

[Photographs at lower left and middle right by Smith and James.

during the lean years while the trees are becoming established and the practice ensures the soil being kept in a state of good cultivation, instead (as frequently occurs) of being in a semi-neglected condition. The soil can be easily compensated for the plant food taken out by the root crops."

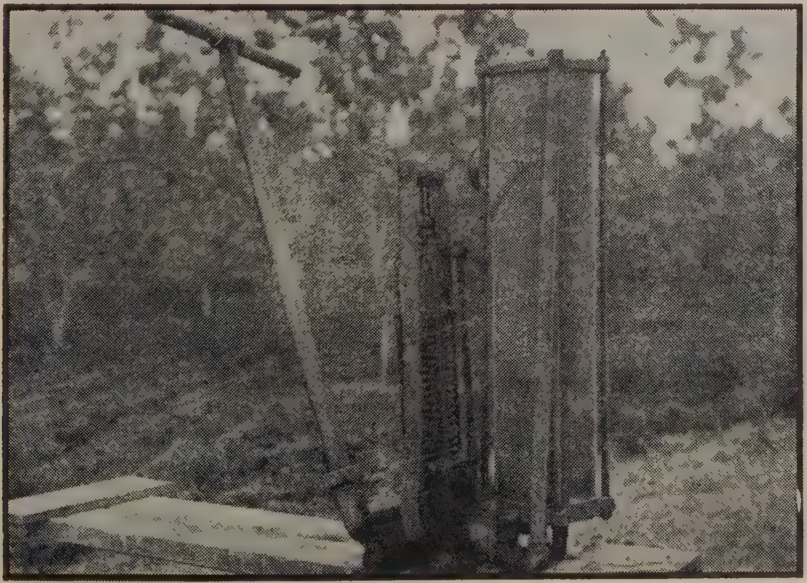
That the soil has been kept in a high state of fertility is clearly evident by the growth and fruiting maintained by original and subsequent plantings. The annual manurial programme maintained by Mr. McMiken has ensured that trees and crops obtain adequate nutriment. The programme followed has included a green or cover crop of blue lupins, peas, or vetches sown in January and disced into the soil during May. This addition of humus to the soil in the form of green manure has been supplemented by dressings of manurial mixtures containing nitrogen, phosphates, and potash, at the rate of 10 to 15cwt. per acre. The practices already detailed, together with applications of lime and the maintenance of clean cultivation during spring and summer, have formed the soil-management programme maintained for 30 years.

The present homestead, developed from the original cottage (inset).

Systematic Replacement

The 8 acres of fruit trees planted in 1914 have been considerably altered by additions and replacements throughout the years and have been gradually increased to the 20-acre orchard of today. Mr. McMiken quickly realised that systematic replacement of uneconomic or unthrifty trees was necessary to maintain his policy of supplying high-quality fruit of the preferred varieties direct to consumers. By a programme of progressive plantings it has been possible to maintain and increase production as demand grew. The replacement policy applies particularly to peaches, which in northern districts are not considered to have a productive life of more than 15 years. That new trees in this orchard may soon be brought to a very productive stage can be seen from the illustration on the opposite page of a young peach tree 3 years from planting.

Additions to the original 8 acres of orchard were made at 2-year intervals until 1925, when most of the original 19 acres of land had been planted. At this stage Mr. McMiken acquired a further 2½ acres of neighbouring land, which enabled him to continue his policy of progressive plantings. In 1941 another 4½ acres were added to the property and the orchard area brought up to 20 acres. The balance of the property is taken up with buildings, cow paddocks, some unplanted land, and some small areas not suitable for fruit growing.


The original hand spray pump used by Mr. McMiken.

Nursery Maintained

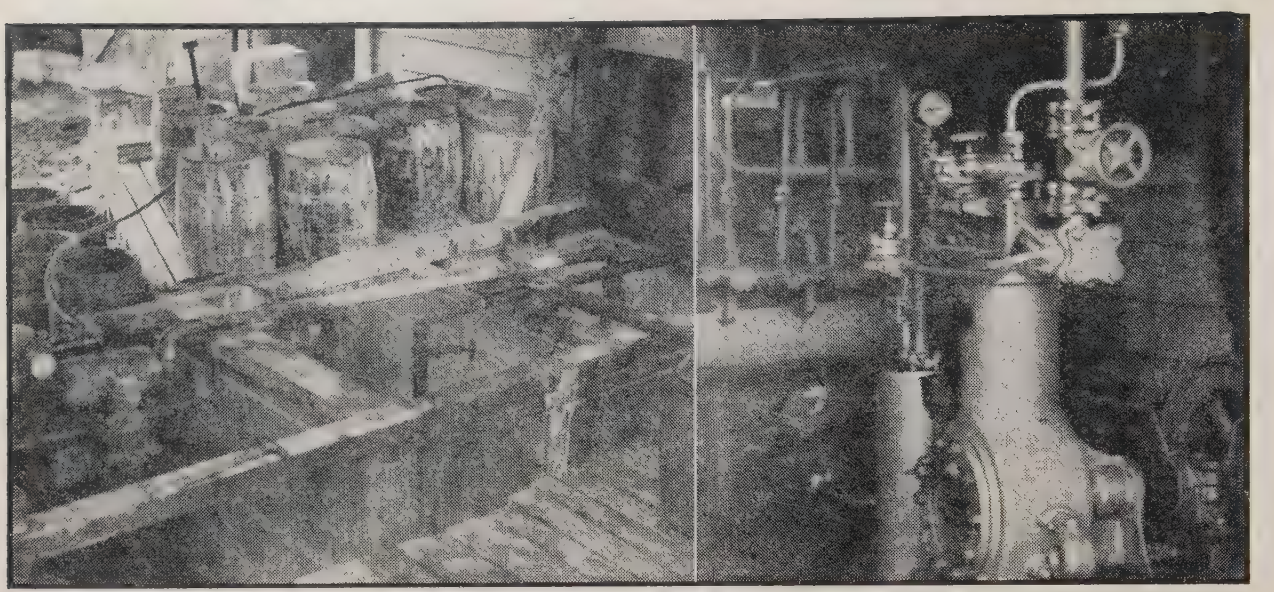
A large number of the trees required for replanting and expansion have come from a small nursery which Mr. McMiken has maintained for many years. The nursery (a useful adjunct to any orchard) has enabled Mr. McMiken to provide some varieties for planting not readily obtainable elsewhere and made it possible for him to propagate trees on root stocks suitable for his locality. Provision is now being made in the nursery for the propagation of apple trees on vigorous root stocks which will be used for replacements when it becomes necessary to remove old and unthrifty trees and replant on the same ground.

Installation of Cool Store

The steady establishment of profitable trees has been reflected in the improvement in equipment and buildings since 1914. The small bach was replaced in 1918 by a 4-roomed dwelling, which was enlarged in 1930 to form the present homestead. The lean-to shed was added to periodically as the demands on shed accommodation increased. The major addition to the packing shed was a cool store erected in 1932 and 1933. The first year the plant and 2 chambers holding 2500 bushel cases of fruit were installed; the following year a further chamber was added, bringing the total cool-storage capacity to 4000 bushel cases.

The provision of cool storage on the property has contributed to the success of the orchard, as it has made control of marketing easier and enabled Mr. McMiken to withhold produce from glutted markets.

Packing-shed accommodation also had to be expanded to house the equipment which the increase in production



Left—Spray vats and pumps. Right—Cool-storage machinery.

made necessary (and possible). The present equipment—sizing machine or grader, lidding presses, conveyers, and fluorescent lighting—is a great contrast to the first lean-to shed, where all the fruit was sized by hand.

Changes in Spray Equipment

Expanding production has made it possible to add not only to buildings but also to equipment. The first spray pump used in the orchard was hand operated—laboriously slow and not particularly efficient. As the trees increased in size and production the defects of this outfit became increasingly apparent to Mr. McMiken and it was replaced in 1925 by a portable machine (a complete unit of pressure pump, engine, and vat mounted on a trolly or chassis and drawn by horse or tractor). The portable equipment was replaced in 1933 by a stationary outfit. (With this type of equipment much the same machinery as for a portable is used, but it is installed near the water supply and the spray mixtures are pumped through pipes to taps which are conveniently placed in the orchard and to which the hoses can be attached.) Though the stationary system has been retained, it has been improved to meet requirements by installing two 3-cylinder pumps instead of the usual one 3- or 4-cylinder pump. By having two pumps it is possible to maintain high pressure with 4 hoses operating. One pump is so installed that when 4 hoses are not required it may be disconnected from the system. The system has proved most efficient and has the further advantage that, should one pump break down, spraying operations can be carried on, using the remaining pump.

Reservoir Erected

A reservoir holding 5500 gallons was erected to provide for quick filling of the spray vats, and Mr. McMiken considers this installation has been most valuable. The reservoir has also proved useful as a reserve water supply and, being close to the homestead, it makes an admirable swimming bath for the staff and family during the summer.

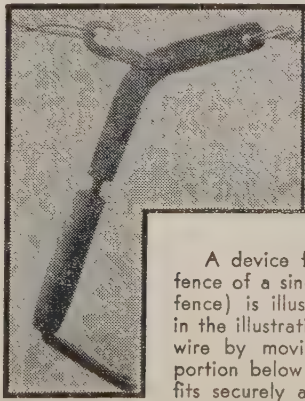
Horse-drawn cultivating equipment has been replaced by implements suitable for use with tractors, two of which are now important items of the orchard machinery.

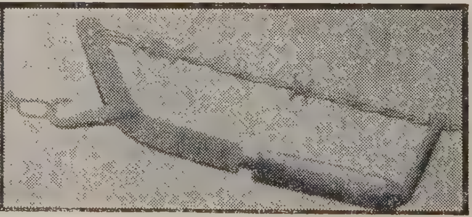
The exact figures for earlier seasons are not available to illustrate the yearly crops produced in Mr. McMiken's orchard, but the following figures for the past season will give an indication of the orchard's productiveness:—

Apples	6,150 bushels
Pears	630 bushels
Peaches	3,760 half cases
Plums	975 half cases

A total crop of approximately 9147 bushels from about 15 acres of bearing trees, which is slightly more than 600 cases to the acre, is a tribute to Mr. McMiken's management and shows the progress he has made from the modest beginning 30 years ago.

Time-saving Fence Device





A device for quickly opening and closing a way through a fence of a single strand of barbed wire (such as for an electric fence) is illustrated above. The device is anchored as shown in the illustration on the left and strain is applied to the barbed wire by moving the handle upward. The hook on the steel portion below the handle is brought over the barbed wire and fits securely against the appropriate barb (see illustration on the right).

The fastener illustrated is 14in. long and in the "open" position the distance between the anchoring hook and the eye where the barbed wire is attached is 5½in.

CONTROL OF MANUKA BY BLIGHT

THE control of manuka by the blight which has already killed considerable areas of manuka in Canterbury is discussed in this article by J. M. Hoy, of the Entomology Division, Department of Scientific and Industrial Research, Ashburton. It amplifies some of the points mentioned in the article "Manuka Blight Survey" by T. G. Sewell, Instructor in Agriculture, Department of Agriculture, Christchurch, which was published in the August issue of the "Journal," and gives a detailed description of the mealy bug which is apparently responsible for the death of manuka.

THREE species of mealy bug are found associated with manuka and kanuka * in New Zealand. One insect, *Coelostomidia wairoensis*, is found principally on kanuka; another, *C. zealandica*, is found occasionally on manuka; the third, a member of the genus *Eriococcus*, attacks manuka and to a less degree kanuka. In all cases the mealy bugs are associated with a black fungus which grows on a sticky excretion (honey dew) from the insect. The presence of this characteristic black fungus or sooty mould has given rise to the name "manuka blight." *Eriococcus* mealy bugs have apparently been responsible for the death of considerable areas of manuka in Canterbury during the last 7 years.

The following description of the two main insects of the three mentioned above as seen on their host plants will enable farmers to distinguish between the two mealy bug species:—

Eriococcus, the insect responsible for the death of manuka, is a small, pale mealy bug about 1/32in. long and oval in outline in the female form. The female can be found in crevices in the bark and is attached to the plant by its long sucking tube or rostrum. The insect is protected by a thin, waxy covering. The excretion of honey dew by the mealy bug falls on the stem of the plant and adjacent leaves, where it is soon covered by a sooty mould. Small white flecks which can be seen on the bark are the cocoons of the male, the only winged form of the insect.

Coelostomidia wairoensis, the mealy bug found chiefly on kanuka, is a considerably larger insect than *Eriococcus* in all stages. The female is oval in outline, up to ⅛in. long, and bright orange-red. A long filament-like tube projects from the hind end of the body. This tube is used for the excretion of honey dew, and in bright sunlight drops of honey dew may be seen adhering to the end of the tube. The waxy covering of this mealy bug is harder than that associated with *Eriococcus* and it projects as a small lump from the surface of the twig. Removal of the covering reveals the insect attached to the stem. If the infestation of *C. wairoensis* is heavy, masses of white "cotton" may be seen adhering to and beneath the bark low on the stem of the plant. Within these masses the male cocoons may be found. The fungus associated with this insect is spiny in appearance, whereas the fungus found on plants attacked by *Eriococcus* is of a soft, sooty nature.

With the slow death of manuka light reaches the ground surface and as a result grass and other types of vegetation are able to grow.

Life History of *Eriococcus*

Though it is possible that there may be more than one generation of *Eriococcus* in a year, this has not been observed. Eggs, which have been found during the period March to August, are laid within the protective covering of the parent, which then dies. The small active insects emerging from the eggs are known as crawlers, and dispersal of the mealy bugs occurs at this crawler stage. In Canterbury crawlers may be present during the months May to September. As crawlers are wingless, they depend either on their legs or the wind to transfer them to new sites. They seek areas where the bark is thin, work their way beneath the bark, insert their rostrums into the sap stream, and begin to feed. Female crawlers, having taken up their position, do not move unless disturbed by the removal of the bark or stoppage of the sap flow in the plant. Unlike the female crawlers, crawlers which differentiate into males pupate when fully fed; the white specks visible on the bark are male cocoons.

Effect of Mealy Bugs on Host Plant

Though *Eriococcus* will attack both manuka and kanuka, very few plants of kanuka killed by *Eriococcus* have been seen. On the other hand the insect has been responsible, either directly or indirectly, for the death of large areas of manuka throughout Canterbury. Where a plant of manuka is attacked by *Eriococcus* the infestation usually starts at the base of the plant, and, as the population of mealy bugs increases, the insects and the black fungus slowly spread up the shrub. Over a number of years the shrub gradually weakens and eventually dies.

Though the name manuka blight suggests a quick-killing disease, this is not so. Where manuka is from 10 to 15ft. high it seems probable that a minimum of 5 years elapses between the initial small infestation and the death of the plant. Even regrowth manuka in an area where a stand has been killed, despite heavy infesta-of *Eriococcus*, does not die for at least 2 or 3 years. Thus farmers who have introduced *Eriococcus* to new areas should not expect a quick kill.

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* Throughout this article the term manuka is used for *Leptospermum scoparium;* kanuka refers to *L. ericoides*. For a fuller account of the differences between these species reference should be made to the article "Manuka Blight Survey", which appeared in the August issue of the "Journal."

A healthy plant of kanuka surrounded by dead and dying plants of manuka.

The killing process is very gradual, especially where the initial infestation is small. Between 6 and 7 years will elapse before even small areas of dead manuka result from new introductions.

Though kanuka is attacked by *Eriococcus*, the plant seems to be able to withstand the effects. The death of manuka is always associated with the presence of *Eriococcus*, though it has not yet definitely been shown that the insect is the cause.

The mealy bug *C. wairoensis* is common on stands of kanuka and to a less degree on manuka throughout the North Island and the northern portion of the South Island, but though in many cases the level of infestation is high, there are few records of either kanuka or manuka being killed by it. Kanuka has been killed at Waimauku, Kaitaia, Opua (Northland), and Tolaga Bay. In all these cases the shrubs killed represent a very small proportion of the total kanuka in the areas. Where kanuka has been killed associated manuka has been little affected by the "blight."

Artificial Spread of *Eriococcus*

Between May and September when crawlers are present transference of *Eriococcus* may be affected by putting infested material in closely-wrapped parcels. On arrival at their destination these twigs may be tied to or thrust into the base of the manuka plants to be infected. Providing crawlers are present and there has not been too much delay between collection and liberation, this method will always result in a take.

Another method which has been used is to shift at any time of the year infested plants well balled with soil, but as it is well known that manuka of any size is a difficult subject for transplanting, the chances of re-establishing an infested plant are not very great. It may be argued that the mealy bugs would move from such dying plants to healthy ones, because when the sap flow of the plant ceases even mature females will migrate. However, as the rostrum of the mature insect is several times longer than the body, it is not likely that mature females would re-establish. Immature females have a shorter rostrum and may be able to reinsert it in a healthy plant, but the use of immature females as a method of transfer cannot be relied upon.

Crawlers could migrate from a dying plant to a healthy host and the use of twigs on which crawlers are present is the only satisfactory means of dispersal. Though it has been stated that the crawler stage was present in Canterbury from May to September, this does not mean that crawlers will be present on any one twig during the whole of the period. The crawler stage is not visible to the naked eye and to ensure the presence of crawlers, infested material should be examined with a good hand lens or under a low-power microscope.

Establishment in North Island

To ascertain whether *Eriococcus* could be transferred from Canterbury to the North Island a small consignment of infested twigs on which crawlers were present was sent to Wairoa in June, 1948. Though 2 weeks elapsed between collection of the material and liberation in the field, it was found in July, 1949, that *Eriococcus* had established on most of the plants to which infested material had been tied. The liberation point was the top of an exposed ridge at an altitude of 1800ft.

The writer inspected an area at Tangoio Hills, near Napier, where *Eriococcus* has been established for about 3 years. Here the blight is following the same course observed in Canterbury. The mealy bug was introduced to the centre of a small patch of manuka in a gully and the inspection this year showed that several plants close to the liberation point were dead and that the level of infestation gradually decreased toward the edges of the stand; all plants were infested to some degree. In another area of manuka about 4 chains away across the brow of a hill small numbers of mealy bugs were found, indicating a natural spread of the blight.

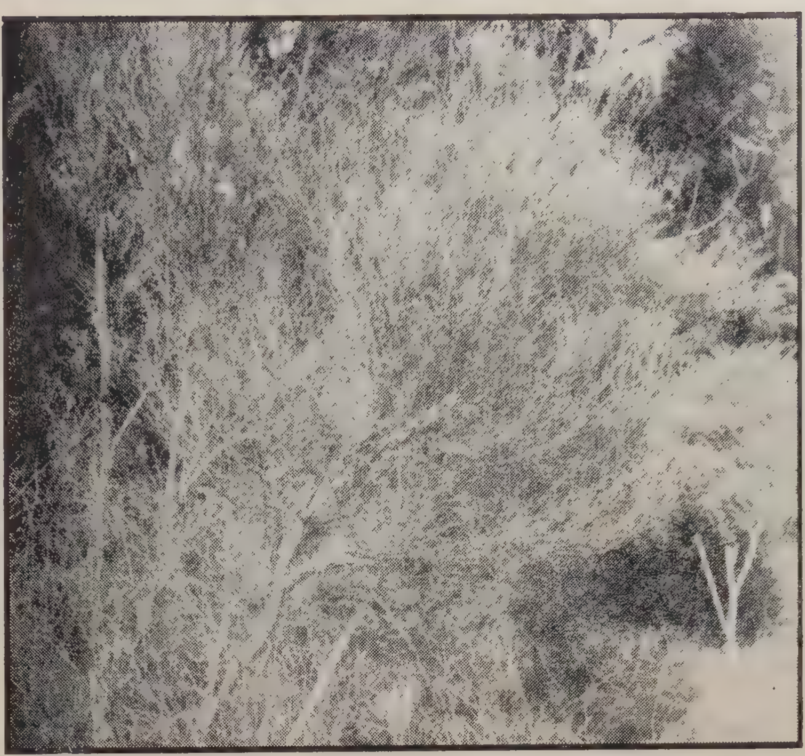
There is another area of about 40 acres of infested manuka near Wairoa, and though the species of insect involved has not been determined, it appears from reports that *Eriococcus* is present.

During the past 3 years many attempts have been made to introduce manuka blight into districts outside Canterbury, particularly in the North Island and in Otago. The majority of these attempts have probably failed

Small regrowths of manuka heavily infested with *Eriococcus*.

because the wrong insect was used (both C. *wairoensis* and *Eriococcus* are present in the Geraldine district, from which most of the infested material has been sent) or because *Eriococcus* was transferred at a stage other than when crawlers were present. Some agents selling infested material, however, have limited distribution to the May to August period, during which crawlers may be present. It is thought that *Eriococcus* must now be established in a considerable number of districts.

As no practical control of *Eriococcus* on manuka other than the burning over of infested areas is known, it becomes necessary to consider what value manuka has and what can be done to combat erosion on areas where it is likely to follow the death of manuka.



Kanuka is occasionally killed by *Coelostomidia wairoensis.*

Uses of Manuka

It must be realised that manuka is not always a problem to the farmer, as it serves a number of definite and useful purposes. The chief of these is the part it plays in the natural regeneration of forest, manuka being an ideal nursery bed for such species as rimu. It also plays a considerable part in preventing erosion on steep faces and in gullies. It is a valuable source of firewood and provides some measure of shelter for stock, though in the latter respect it is not as important as kanuka, which is rarely killed by *Eriococcus.*

Position in Canterbury

An understanding of the position in Canterbury is important before considering what may be done to compensate for loss of manuka where it is serving a useful purpose. On flat country the gradual killing of tall stands of manuka has led to a steady increase in light intensity at the soil surface, followed by the establishment of volunteer grasses and weeds and considerable regrowth of manuka. The young manuka is receiving a heavy initial infestation of *Eriococcus* and usually is being killed before reaching a height of 3ft. In most flat areas the stands of manuka are being replaced by a browntop-danthonia dominant sward, which is further encouraged by grazing. A similar situation exists on the easier hill country, except that in some areas bracken and gorse are getting a hold.

On some country, particularly where fertility is low, plants such as gorse and fern rapidly replace the dying manuka.

At Beautiful Valley, a few miles south of Geraldine, several hundred acres of manuka killed by *Eriococcus* have been replaced by tainui (*Pomaderris apetala*). This plant appears to be a vigorous grower and is taking possession even before the manuka is completely killed. On some exposed ridges several manuka trees killed by the blight have been wind blown as the roots rot. On steeper country and on cold faces kanuka is growing in association with manuka and the former has been little affected by the blight which has killed the manuka. On this class of country manuka has been replaced largely by gorse and bracken.

No evidence could be found to suggest that the death of manuka had been responsible for erosion. It seems that under Canterbury conditions the gradual death of the manuka allows colonisation by other plants before the manuka roots rot and lose their hold.

Death of Manuka in North Island

Manuka has an influence in preventing erosion either as a discontinuous stand associated with a grass sward or as a dense stand with little or no ground cover. The first type of association prevents slipping and sheet erosion and gullying where stock tracks do not open up the soil. The second type prevents slipping and gullying and reduces but does not eliminate surface run-off.

Left—Manuka being killed by *Eriococcus* on hill country in Canterbury. Right—Manuka killed by *Eriococcus* on the Canterbury Plains near Ashburton.

Should *Eriococcus* become established in an open stand of manuka on steep country, as the manuka dies the grass will thicken to form a dense sward. Where a dense stand of manuka is gradually killed there will be a steady increase in light at the soil surface, which should lead to the establishment of grasses and weeds. In both cases there will be considerable regeneration of manuka which in turn will become infested by *Eriococcus* from the older, dying plants.

Where it is felt that the angle of the slope is such that pasture will not be sufficient to hold the soil some system of spaced planting or afforestation can be instituted. Quick-growing trees such as willows or poplars could be used for spaced planting and *Pinus radiata* for afforestation. It cannot be too strongly emphasised that the killing of manuka by *Eriococcus* is a gradual process spread over a number of years, which allows ample time for the establishment of trees before the manuka loses its hold.

On steep country a stand of dying or dead manuka should never be burned, because this will upset the natural succession and may lead to erosion.

If *Eriococcus* becomes established in a thick stand of manuka being used as a nursery for trees, in addition to gradually killing the manuka it may have some adverse effect on the sheltered trees. Honey dew from mealy bugs falling on the leaves of the trees will result in the growth of black fungus, and, though where trees are quick growers the fungus will have little effect, it is likely to affect slow-growing species adversely.

Biological Control of Manuka

Manuka occurs to a considerable extent on country capable of carrying a satisfactory pasture, but because of present labour costs, existing methods of control can seldom be employed. The use of a biological agent, *Eriococcus*, presents a satisfactory alternative control, though there are disadvantages attaching to its use. It will be necessary to replace manuka with other trees where an erosion danger exists, and an ideal nursery cover for the regeneration of native forest will be lost.

It must be realised that quick results cannot be expected from the use of *Eriococcus;* nor is the death of the manuka the end of the problem. To replace manuka with a useful ground cover correct liming, topdressing, and stock management, together with space planting of trees or afforestation on steep faces where erosion danger exists, are also necessary. If they are attended to, manuka blight can be a useful adjunct to increased production.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during August, with comparative figures for the same month of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

	Tons				Tons
Period	Creamery	Whey	Total	Percentage Inc. or dec.	Total in store at end of mth.
August, 1949	8,959	106	9,065	+30.356	11,163
August, 1948	6,875	79	6,954	—	10,221
Increase or decrease	+2,084	+27	+2,111	—	+942

CHEESE—

	Tons				Tons
Period	White	Coloured	Total	Percentage Inc. or dec.	Total in store at end of mth.
August, 1949	1,394	90	1,484	+21.639	3,211
August, 1948	1,220	—	1,220	—	2,223
Increase or decrease	+174	+90	+264	—	+988

If these figures are converted into butterfat equivalent, there is an increase of 29.648 per cent. in butterfat graded for the month as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

TURNIP AND SWEDE VARIETIES FOR SUPPLEMENTARY WINTER FEED

SEASONAL NOTES Contributed by the EXTENSION DIVISION

THE acreage sown out with turnip and swede seed each year is greater than that sown to any other crop. The area is almost entirely devoted to the production of supplementary winter feed, and farmers, by careful attention to cultivation and to the selection of suitable varieties, can do much to ensure successful crops for this purpose.

IN southern districts in particular tillage of the land broken up in early winter out of lea will be well advanced and preparation in hand for the final conditioning and sowing. A high plane of soil conditioning before sowing is probably more important today than in the past, for with the change to power farming and decrease in permanent farm labour there is unquestionably a greater trend to neglect in giving the crop the same degree of attention in cultural operations and weed control than when a permanent teamster and other labour were employed on every farm where roots were grown to any extent. Today it is not uncommon to see large areas given no attention whatever after sowing—a rare occurrence before the change-over to mechanisation.

When it is realised that a 6lb. turnip, which is rather a small specimen, is expected in 6 months to extract from the soil and atmosphere through the agency of its roots and leaves and elaborate into forms of substance suitable as food for animals an amount of matter 1,000,000 times its original seed weight, the importance of good soil conditioning and subsequent care of the crop should be very apparent.

Along with other factors, success in obtaining the best return under prevailing conditions depends to a certain extent on the variety sown. Varieties are partial to the regions and conditions in which they do best, a factor that is sometimes apparently not fully appreciated.

At present farmers have a choice of 14 varieties of New Zealand-grown Government-approved seed—six types of swedes, five yellow-fleshed turnips, and three white-fleshed turnips. A description of these varieties follows. If satisfactory crops have been obtained over a period of years from any particular variety or varieties, it is a sound policy to continue with them.

Swedes

N.Z. Superlative swede: Purple top and yellow flesh. It represents the early-maturing group, which includes such varieties as Masterpiece, Success, and Magnificent. It is suitable for all swede-growing regions, but is not recommended for late feeding, particularly in regions where hard to severe frosty conditions are experienced. It yields well and the flesh is medium to soft. Superlative is a popular type for market gardening purposes.

N.Z. Grandmaster swede: Purple top and yellow flesh. It represents the general main-crop types used in New Zealand. The distinction between this variety and Superlative, however, is not well defined when they are grown in the warmer districts. The skin and flesh are inclined to be harder. It continues growth later into the winter than Superlative, and is more adaptable to medium to rich, heavy land in the colder regions of both islands. It is very similar to Majestic, Tipperary, and, to a less extent, Peerless.

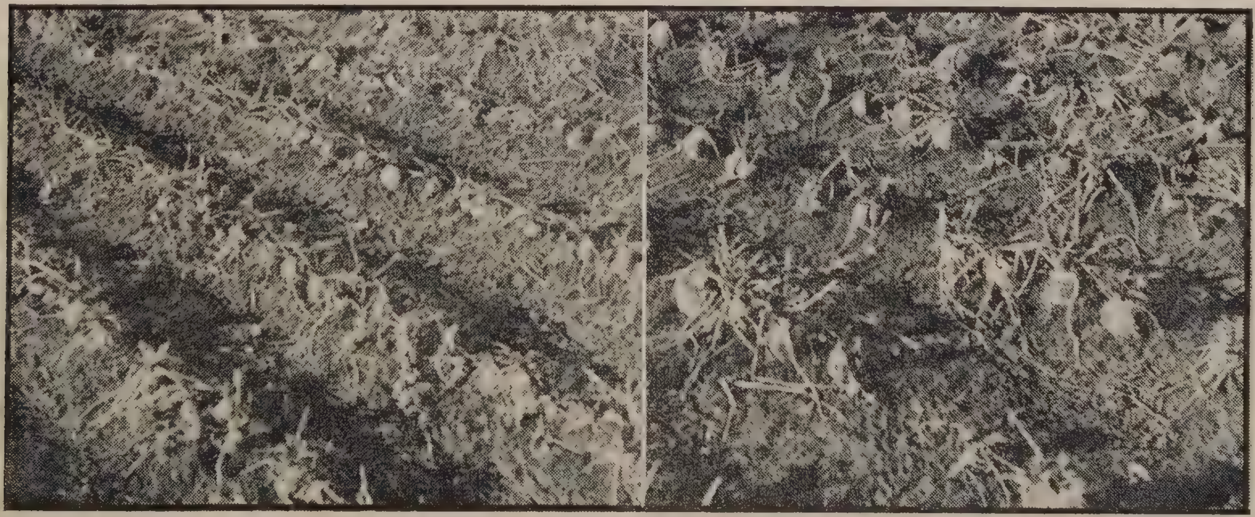
N.Z. Crimson King swede: Purple top and yellow flesh. It represents the general main-crop type. It is adaptable to an extensive range of soil types and climatic conditions, and does particularly well on well-farmed land with clay subsoil. It tends to a more tankard conformation than Grandmaster or Superlative, and often develops a curved root and in heavy crops develops a distinct lean. Crimson King, Monarch, and Elephant are all much alike.

N.Z. Resistant swede: Though Resistant is classed as a green-top yellow-fleshed swede, some bulbs acquire a bronze coloration as they reach maturity. It is particularly suitable for late-winter feeding, requires a long growing period, and is adaptable to most soil types in medium- to high-rainfall districts.

It is the best all-round swede available for extreme, cold conditions on the higher elevations and where fog and mists are experienced during the growing period. It is a high-quality swede, ripens late, and is an excellent keeper; all farmers in swede-growing districts except those in the drier regions should sow at least part of their crops with this variety for late-winter feeding.

Resistant is an improved type of Wilhelmsburger that has been selected for keeping qualities, and is identical in appearance.

N.Z. Sensation swede: Purple top and white flesh. It is a main-crop type and has good keeping quality. This



The effect on the bulb development of yellow-fleshed turnips of thinning and drawing the earth away from the plants is shown above. Left—Crop unthinned. Right—Crop thinned and earth drawn away from the plants.

TURNIP AND SWEDE VARIETIES

Where turnips follow swedes an application of an additional ton of carbonate of lime after the feeding off of the swede crop is sound practice.

variety develops a long taproot and some roots are inclined to be fangy. It is highly resistant to severe damage by "blight" (aphis attack) and for this reason, and because of its long taproot, it is to be preferred to the stub-rooted types on the drier country. Every farmer in the drier districts and in regions where "blight" has to be contended with should give this variety a trial. Sensation is a strain of the original Vilmorin, but is less fangy.

N.Z. Calder swede: This is an entirely-new type of swede, being introduced to farmers generally this year for the first time. It was bred by the Agronomy Division, Department of Scientific and Industrial Research, primarily for Canterbury conditions, under which the ordinary stub-rooted varieties are adversely affected by dry spells and by "blight," to which Calder is highly resistant.

The roots are clean and tapering, the general conformation being of the tankard type, and the neck and shaw are medium. The colour is very light purple and the flesh is yellow and crisp. In field trials it has shown to advantage under conditions for which it was bred, but on the heavy land in southern districts it has not given quite the yield of the other purple-skin types. Nevertheless, all farmers in swede-growing districts could quite well try a pound or two of this new variety, and those in the drier districts might well extend the trial to occupy a substantial part of their crop.

Yellow-fleshed Turnips

Yellow-fleshed turnips are available under the following names: N.Z. Purple Top Yellow, N.Z. Green Top Yellow, N.Z. Purple Resistant, N.Z. Green Resistant, and N.Z. Soft Green Top Yellow. With the exception of Soft Green Top Yellow, all are typical of the late-maturing Aberdeen type, which is rather hard fleshed and of good keeping quality. Purple Resistant and Green Resistant are club root-resistant types of Aberdeens and in comparative trials have proved to be as good as the best of seeds of similar type from overseas.

These hard types of yellow-fleshed turnip are somewhat exacting in their requirements. They require a cool climate and seem to do best on well-farmed land with a clay subsoil. The greater part of the crop is grown in Otago and Southland. The resistant types are intended for sowing as a second crop after swedes where the breaking up of a further area of grass for roots is not desired.

N.Z. Soft Green Top Yellow is quite distinct from the Aberdeen types. The roots are cleaner and grow more above ground, and the leafage is not as heavy. It is suitable for clay loams in the cooler districts and is intended for midwinter feeding. Owing to its clean roots, this variety is more suitable for the dairyman on winter milk supply than the Aberdeen types where turnips are required for pulling and carting out to stock. Though termed a "soft," yellow-fleshed turnip, it is not soft to the extent that the roots will collapse in early winter, but the variety nevertheless is appreciably softer in the flesh than the Aberdeen types.

In the cultivation of yellow-fleshed turnips it is essential to draw away from the bulbs as much earth as possible in weed-destroying operations. The tendency with tractor-drawn cultivation is to mould the earth back against the roots as if setting up ridges, but this is quite unsatisfactory, resulting in unduly deep-set roots with big tops. A reversion to the type of cultivation done by the horse-drawn scuffler where the earth was drawn away from the roots would result in a much better crop.

White-fleshed Turnips

The varieties in the white-fleshed turnip class are N.Z. Green Globe, N.Z. Red Globe, and N.Z. Purple Globe. N.Z. Green Globe is unquestionably the best of the "soft" or white-fleshed turnips. It is grown extensively in both North and South Islands in varying climatic conditions and soil types; it is grown on high-fertility land suitable for swedes and also in conditions altogether too dry for swedes. On high-fertility land the bulbs are very large and must be consumed in late autumn or early winter, as flesh collapse is more pronounced than it is in crops grown under drier conditions on poorer soil types where bulb development is not as great. When it is grown in dry conditions on the poorer soil types the flesh is firm and keeping qualities are excellent, often rivalling those of the early-maturing swedes. In fact in some dry districts it is not uncommon to see swedes being grazed first and Green Globe turnips held for late-winter feeding. N.Z. Green Globe is similar to Hardy Green Globe and Imperial Green Globe.

N.Z. Purple Globe and N.Z. Red Globe are also white-fleshed turnips, the names being descriptive of the skin colour above ground. Both are early-maturing types, Purple Globe, if anything, being earlier than Red Globe. Both are recommended for dry districts and for the poorer types of soil. When sown early in the new year on stubble land these varieties will supply supplementary feed in the winter, and if sown in the spring, are useful varieties as a precaution against dry conditions in the late summer and autumn. Neither variety has the keeping quality of Green Globe, but they both develop more quickly.

Diseases

Apart from the soil-borne fungus which sets up a condition known as club root, the main disease affecting turnips and swedes is dry rot. There is little the farmer can do to combat dry rot other than to sow a range of varieties so that stock move from early-maturing to late-maturing types as the season advances. In many districts it would be advantageous to sow, say, a third of the crop in Superlative for early feeding, a third or a little more in Grandmaster or Crimson King for midwinter feeding, and the remainder of the area in Resistant for feeding off last. By doing this the roots are utilised when they are at their best and wastage from disease is greatly reduced, as it gets more extensive as the roots age after reaching maturity.

Brown heart condition does not appear to be getting less common; it is probably more prevalent. If the lime status of the soil is increased to too great an extent, problems associated with overliming are liable to occur. One of the effects of overliming is to reduce the availability to the plant of boron in the soil and it is possible as a result to get boron-deficiency symptoms in crops grown on such soil. Brown heart is a symptom of boron deficiency in swedes. However, the trouble can be readily overcome by the simple expedient of applying commercial borax to the land. In southern districts it is mixed with carbonate of lime to act as a spreader and broadcast at the rate of 15 to 20lb. per acre and harrowed in before sowing, or it may be mixed with the fertiliser and sown through the front spouts of the ridger at the rate of 5 to 8lb. per acre. Commercial borated reverted phosphate, specially manufactured for the purpose, is available and should be used in the same way. It is thus kept from immediate contact with the germinating seed, which is most essential.

Under North Island conditions, where the general practice is to mix the seed with a quantity of fertiliser and sow it broadcast, borax at the rate of 8 to 10lb. per acre mixed with 2cwt. of fertiliser to act as a spreader and applied a few days before sowing is advocated. Applications even at a higher rate when made in this manner have had no detrimental effect on the strike, but the quantities indicated are generally sufficient to control brown heart.

THE HOME GARDEN IN NOVEMBER

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland.

WITH the weather more pleasant and the growth of plants more marked generally, the home gardener is induced to spend much time in the vegetable garden in November. At this time of year there is plenty of work to be done. The ground should be kept cultivated, weeds removed between growing crops, and thinning done where necessary. In most districts the seed of swedes, peas, carrots, beetroot, spinach, and such vegetables as savoy cabbage, broccoli, cauliflower, brussels sprouts, and kale can be sown; the greens will be required for late autumn and winter use.

THE sowing of salad crops such as spring onions, radish, and lettuce for successional harvesting and the planting of cabbage, cauliflower, and lettuce to mature in late summer and autumn will need attention in November. With the exception of a few areas such as Canterbury and southern districts where it is safer to delay planting until after the middle of the month, the sowing or planting of frost-tender vegetables such as french and runner beans, tomatoes, marrow, pumpkin, cucumber, egg plant, capsicum, squash, sweet corn, and kumaras may be continued. Plants protected with cloches or frames should still be covered until the later part of the month.

Supports should be provided for runner beans and tall-growing tomatoes and should be placed in position without delay. If staking is delayed too long after planting, the roots of the plants may be injured and undue consolidation of the soil may result through tramping it. If it is intended to plant early celery, the beds should be prepared now.

Early-planted potatoes can be moulded up and the main-crop planting completed. Asparagus beds which have been producing spears for the past 8 weeks should now be allowed to develop fern growth, as harvesting this vegetable for too long a period weakens the crown and does not give the plant a chance to build up its resources so necessary for next season's crop.

The rhubarb bed will also need attention. Rhubarb is a heavy feeder and requires several applications of fertiliser during the growing season; this is best applied after pulling, which should never be too severe. Too-frequent or too-heavy harvesting is an exhausting process and does not give the plant time to build up sufficient quantities of plant food. Newly-established rhubarb plants should not be pulled during the first year and only sparingly the second season. Rhubarb should not lack moisture and will benefit from frequent applications of liquid manure.

Onion crops will now be showing signs of bulbing and should be weeded and lightly cultivated. Care should be taken not to injure the bulbs, as this will seriously impair their keeping quality later. In soils where growth is slow a side dressing of nitrate of soda at the rate of 2oz. per square yard may be applied or, if conditions are dry, it may be watered on.

Early sowings of dwarf peas will now be reaching maturity, and if birds are troublesome and are attacking the nearly-mature pods, they can be frightened off by attaching strands of black cotton just above the pea rows, or wire netting can be placed to cover the row.

Cabbage, cauliflower, and lettuce plants which are showing signs of hearting will benefit from an application of animal liquid manure, or, if this is not available, 1oz. of nitrate of soda to a gallon of water applied at the rate of 1 pint to each plant will suffice.

Potatoes in localities where potato blight is prevalent will need frequent spraying and those planted in early September should have formed fair-sized tubers by the end of November. Early potatoes are best used when

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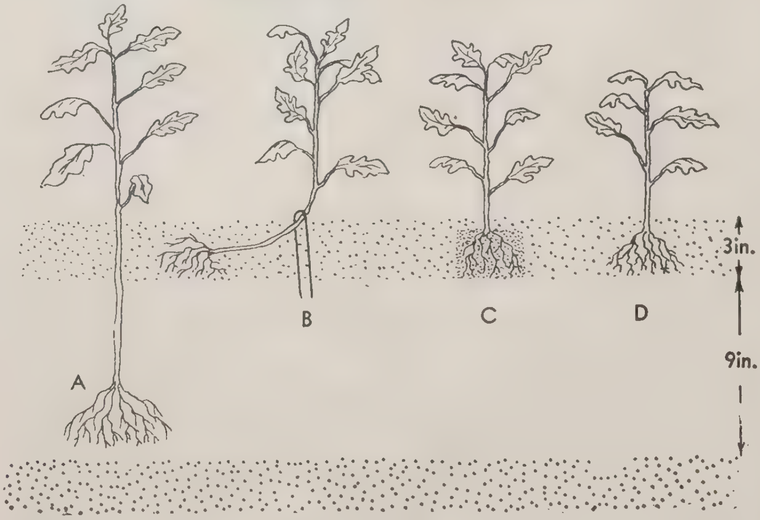
Heading photograph by Green and Hahn Ltd.

PLANTING TOMATOES



Tomatoes should not be planted more than 3in. deep, as the soil below this depth is usually much colder. A—Planted too deep. B—When plants have become drawn (long) they should be layered and a "hairpin" (a 12in. piece of No. 8 gauge plain fencing wire bent double) will support the plant until new root growth forms on the covered stem. C—A plant set with soil attached. It is planted a little deeper than it grew in the seedling box. D—A sturdy plant set at the correct depth.

large enough, as they do not keep as well as those grown for main crop and are not suitable for long storage.

Pumpkin, Squash, and Marrow

Pumpkin, squash, and marrow are selective names given to a very large group of varieties of the cucurbit family and some members of the gourd family. They cross readily and a certain amount of confusion is often caused in the correct classification of varieties. Most pumpkins and some squashes are known as belonging to the species *Cucurbita maxima*, but the number of varieties is so great that several known as squashes are of the species *Cucurbita moschata*, and species of vegetable-marrow (*Cucurbita pepo*) are sometimes known as summer squashes.

Pumpkin, squash, and vegetable marrow are sensitive to light frosts and are all vine-crop vegetables, but they are more tolerant of a cool, wet environment when young than cucumbers or melons. They require a warm but not extremely hot growing season. Storage varieties in general require a long growing season; early-maturing types, which are used chiefly in the immature stage, can be grown where the season is relatively short. The plants are of two types, bush and trailing; where space is limited the bush type is more suitable.

Any fertile soil that is well supplied with humus and not extremely acid or alkaline will produce good yields of suitable varieties of these vine crops. In districts where the growing season is comparatively short it may be advisable to start the plants on a hotbed in pots or boxes under glass. Pots or paper containers are best, as the plants are particularly sensitive to transplanting and where this is practised they should be shaded for a couple of days. If the seedlings are raised under glass, about 3 to 4 weeks should be allowed before they are planted out in the garden, as handling is difficult if the plants get too large and they become root bound and may be seriously checked. The temperature for raising seedlings should be between 60 and 65 degrees F., and plants should be hardened off (subjected to outside conditions) before being planted out in the garden.

Manuring

Well-drained, light, sandy soils are best for early crops, but for main crops heavier soils usually yield best and produce better-quality fruits. The humus content of the soil can be built up by digging in a green crop, but good results are obtained if a round hole 6in. deep and 2ft. across is taken out and filled with manure (preferably partly rotted, fermenting stable manure) and the soil replaced and raked down to form a round and slightly raised flat-topped bed; this is known as the "hill" system of sowing. If these fillings are not available, a mixture of equal parts of blood and bone and superphosphate can be substituted by mixing it up with the filling soil and using the mixture at the rate of 4 to 6lb. to each hill. For the non-trailing types such as bush marrows the hills should be 4ft. apart; for all other varieties 6 to 8ft. spacings should be allowed.

Seed should be set 1in. deep at intervals around the edge of the bed by pushing it into the soil point end down; this tends to stop the seed from rotting through moisture gaining entrance, and the shell of the seed remains longer on the first two leaves and so helps to protect them from adverse weather. More seed than plants required should be set and the plants thinned to four.

From the earliest stages of growth light cultivation to aerate the soil and check weed growth around the plants is necessary and the land between the hills should not be allowed to consolidate or foster weed growth. Apart from watering if conditions become dry and weed control, little attention should be necessary after the plants are established, except that the trailing varieties may need the terminal shoots of the main runners pinched back occasionally to keep the plants compact and to promote the setting of the fruit close to the bases of the plants. All these crops will tolerate partial shade and can be grown with such crops as sweet corn or between fruit trees.

Harvesting

The fruits of marrows are best harvested when large enough; if they are removed as soon as possible (10 to 12in. long is a good size), the plant will produce a larger yield and the fruits will be much more palatable. If it is intended to grow large fruit for exhibition purposes or for storing, they may be left on the vine longer.

Pumpkin, squash, and marrow store well. Fruits used for storing should be fully mature before harvesting and carefully handled, and care should be taken to avoid breaking the stalk or bruising the skin. The fruit may be detached from the vine with a pair of secateurs, the stalk being cut 1in. from the fruit; a long stem is more likely to get broken off or to puncture the skin of other fruits. Fruits should be stored in a dry and frost-free shelter and keep better if not placed one on top of the other.

Recommended Varieties

Pumpkin: Triamble, Crown, Queensland Blue (Beaudesert), and Red Warren.

Squash: Golden and Green Hubbard, Banana, and Table Queen or Acorn.

Vegetable marrow: Bush type: White and Green Bush and the Italian marrow Zucchini and Cocozelle. Trailing type: White, Long Green, and Cream.

Scallop or custard marrow: Early White Bush, Early Golden Bush, and Goldmine.

Orange marrow, also called vegetable spaghetti, is a very useful vegetable and an interesting novelty, being often mistaken for an orange. If the yellow, orange-shaped, mature fruit is cooked whole for about 20 minutes and then cut open, the flesh forms loose shreds somewhat like spaghetti. It is a delicious vegetable when partly ripe if it is cut in two, the seeds and pith removed, and it is cooked with the skin attached and served with butter.

Kale or Borecole

Kale is a member of the cabbage family and produces very large leaves which are used as greens and for soups. The wild sea cabbage (*Brassica oleracia*), which is commonly found on the sea cliffs of England and other parts of Europe, is probably the parent from which the various cabbage varieties now in cultivation have been

[*Sparrow Industrial Pictures Ltd. photo.*

Orange marrows, besides being a useful vegetable, are an interesting novelty. If displayed in a fruit bowl, they look like oranges.

derived. Kale is the nearest of these to the parent form, and has been cultivated for many years. The most common of the kales is one from ancient times known in France as Cavalier kale; it grows 5 to 6ft. high and bears large, flat leaves. Other kinds show various degrees of division and curling of the leaves, which are sometimes tinged with purple. The Scotch kales or borecoles are the best known. Collard, which is grown fairly extensively in South America, is classed as a non-heading cabbage, but is actually a kale.

Culture is similar to that for cabbage, though kale is much hardier and will succeed in poor soil. It is advisable to sow seed in beds in September for late summer use and in January for winter use; when the young plants are 4 to 6in. high they should be transplanted 2ft. apart, with 2ft. between rows. A good depth of well-manured soil is desirable. This vegetable adapts itself to cold conditions and can be grown safely in southern districts. Kale is harvested either by cutting the entire plant or by taking the larger of the young leaves.

Good varieties are Green Curled and Dobbies Improved Curled.

Egg Plant

The egg plant is a native of the tropics, possibly India, where it is called bringal, and is eaten in curries or roasted in red-hot ashes and mashed with salt, lime juice, onions, and peppers. In France it is called aubergine. There are a wide range of varieties with fruits of several colours—purple, white, ash coloured, green, and brownish. In shape the fruits vary from elongated to round. At present the only one of interest in New Zealand is the purple-fruited type.

Distinctly a warm-weather plant, the egg plant requires a long growing season (about 5 months) with high average day and night temperatures. Egg plants grow well in a wide range of warm, fertile, well-drained soils. An abundance of plant nutrients and organic material is desirable, as the plant is a heavy feeder and responds to liberal manuring.

The plants should be raised under glass. As they are rather sensitive to transplanting, special care in raising is necessary and the use of plant containers (earthenware or paper pots) may be advisable. Plants should be set out 24in. apart in rows 3ft. apart and November is considered the most favourable time for planting. In localties where the season is short the fruits should be thinned to 4 or 6 to each plant. As the fruit becomes dry and tough in the flesh if over-mature, it should be harvested as soon as it has attained a full purple colour. About half a dozen plants should meet the requirements of the average family.

Good varieties are Black Beauty and New York Improved.

Mustard

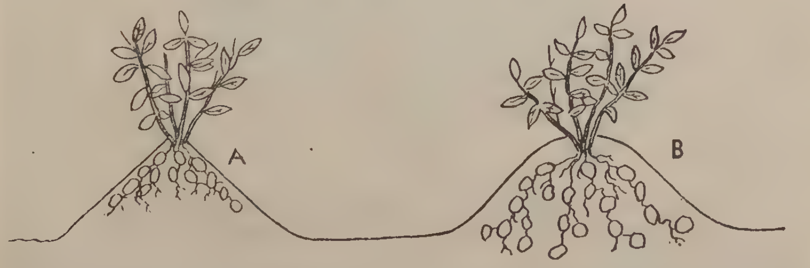
Mustard spinach and white mustard are grown for garnishing in precisely the same way as cress and are cut at the same period of growth. Mustard and cress are generally sown to mature at the same time; as mustard matures more quickly, cress seed is generally sown 4 or 5 days before it.

White mustard is a vigorous plant that quickly bolts to seed. The leaves are dark green and are useful in salads when young. The large, pale-brown seeds are used for table mustard. Black or brown mustard is grown in California for its small, dark-brown, pungent seeds, which are used solely for the manufacture of table mustard.

Spinach mustard, including the Tendergreen strain, is a quick-growing type and a particularly fine strain. It has oblong, thick, dark-green leaves and has a most delicious flavour peculiarly its own and combines in itself the qualities of both spinach and mustard. As it does not seed as quickly as the white mustard, it is better suited for sowing in districts where hot, dry conditions exist, and need not be confined to spring and autumn, which is advisable for white mustard. Another variety, Chinese Broad Leaved, is also sold by some seedsmen. It is a large plant, with broad, large, slightly crumpled, oblong leaves scolloped at the edges.

Mustard spinach and white mustard have a mild flavour, and though they will grow fairly well in the poorer soils, they do best in rich, moist soils and in moderately cool conditions. The seed should be sown ¼in. deep in rows 15in. apart and thinned from 6 to 8in. apart in the rows. Successional sowings every fortnight from March to December will make the salad available over a long season; ½oz. of seed is sufficient for 100ft. of row and the plants can be harvested in from 3 to 5 weeks and can either be cooked like spinach or used in salads.

MOULDING POTATOES



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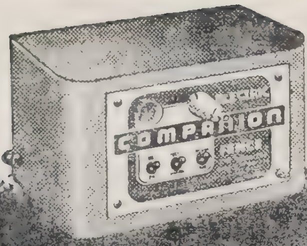

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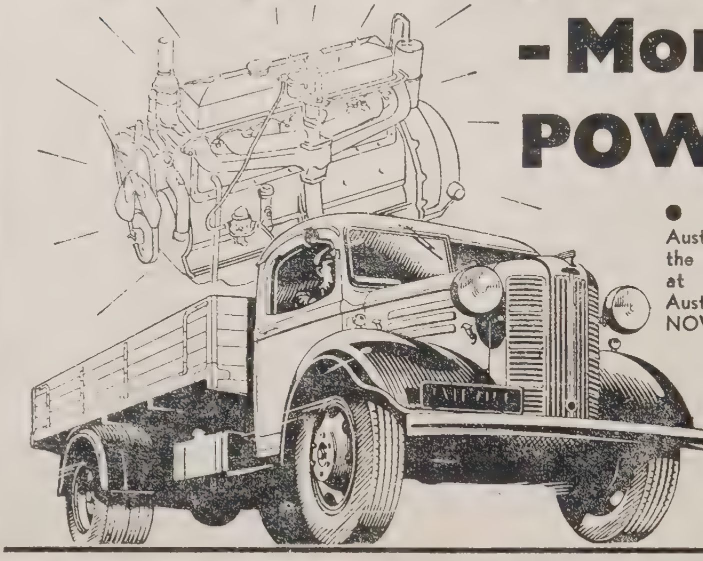

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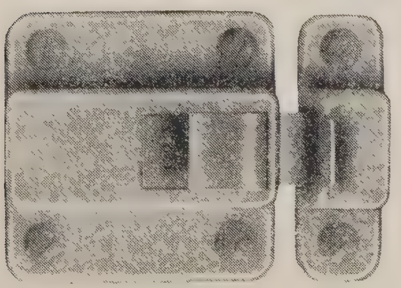

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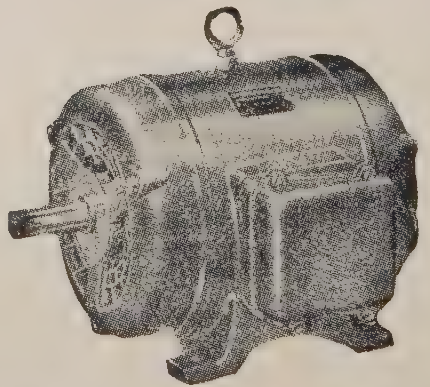

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Melons

Warm, rich, well-drained loams or sandy soils well supplied with decomposed organic matter provide the most suitable conditions for melons.

The plants are not tolerant of cold, wet soils or cold weather and for this reason melons rarely grow successfully in southern districts unless grown under glass. Cultivation under glass is similar to that for cucumbers except that less bottom heat is required.

Rock Melons and Cantaloupes

The true cantaloupe is a type with a hard rind and a rough, deeply-furrowed surface and is rarely grown in this country. The melon commonly grown here is the rock or musk melon, characterised by a soft rind covered with cork-like netting. The name "cantaloupe" is frequently though incorrectly used in New Zealand for those varieties with heavy netting and comparatively hard shell suitable for transporting. Satisfactory winter keeping varieties are Casaba and Honey Dew. Rock melons do not cross with cucumbers, pumpkins, or water melons.

To plant rock melons hills should be made as described for pumpkins and should be spaced 3ft. apart in rows 5ft. apart. Wider spacings may be desirable in favoured warm areas where growth is more vigorous. Plants can be spaced four to a hill.

To induce lateral growth the leader should be pinched out as soon as three or four rough leaves have grown. When four main branches are well grown the fruit-bearing laterals may be allowed to develop and flower. The fruits should be thinned to about six or seven to each plant when they are about 1in. long and any subsequent blossoms as well as any weak growth removed. As soon as the fruit begins to ripen it should be protected from excess moisture by stretching a canvas sheet over a frame; otherwise the flavour is greatly impaired and the most delicious varieties become watery and insipid. This precaution is necessary only in very wet weather. The fruit should be picked as soon as it is ripe and this condition can be detected by the distinct perfume of the fruit. It is also indicated by the end of the stems holding the fruit turning soft.

[*Sparrow Industrial Pictures Ltd. photo.*

Grown under favourable conditions, the egg plant crops well and its large, purple-coloured fruits are very attractive.

Recommended varieties are Hale's Best, Bender's Surprise, Honey Dew, and Casaba.

Water Melon

The culture of water melons is similar to that of rock melons except that water melons require a longer season of growth. They are more resistant to dry conditions and will grow in soils that are rather acid, but grow best on virgin soils or rich, sandy loams.

[*Sparrow Industrial Pictures Ltd. photo.*

Two varieties of water melon. Left—Ice Cream. Right—Hale's Best.

Home gardeners often find difficulty in producing water melons, as the plants are too long in making growth and form fruit too late in the season for it to mature. To overcome this plants should be raised in pots under glass and set out in a warm, sunny, well-drained situation. Dig a round hole 6in. deep and 2ft. across and fill it with manure (preferably partly rotted, fermenting stable manure), replacing the soil and raking it down to form a round and slightly raised flat bed. When plants are about 6in. high carefully remove them, with soil attached, from the pots and plant them four to a bed and shade them with newspaper for 2 days. If more than one bed is required, plants should be spaced 6ft. apart.

Some difficulty is found by the amateur in determining when the water melon is ripe. When the melon is immature it gives a metallic and ringing sound when hit with the back of the finger, whereas when it is ripe the sound is muffled and dull.

Good varieties are Ice Cream, Coles Early, Klondyke, and Hawkesbury.

Preserving Melons

Preserving melons belong to the same family as water melons, but the flesh remains firm and does not change colour. They are much hardier and easier to grow than water melons and produce heavier crops.

Popular varieties are Citron (red seeded) and Pie (green seeded), which are principally used for jam making or for pies.

Okra or Gumbo

The okra plant, which is a native of sub-tropical Africa, is an erect, annual, pod-bearing plant which is grown for its edible, horn-shaped pods. The plant is frost tender and attains a height of from 2 to 6ft. according to variety and climate. Okra is a useful ingredient in soup, to which it gives a flavour and a glutinous consistency. It is also used in stews and for canning.

Okra can be grown successfully wherever maize or sweet corn will thrive. Prepare the ground as recommended for sweet corn in the last issue of the "Journal" and sow the seed ½ to 1in. deep in clusters of three at 2ft. intervals in rows 24 to 30in. apart. When the plants have reached a height of 3in. the clusters should be thinned to a single plant, the most vigorous being left.

In warm districts the seed may be sown from the middle of October, but generally November is most favourable. A reliable guide is not to sow okra seed earlier than it would be safe to make sowings of sweet corn in any particular district. Okra plants can be started under glass like tomatoes and set out when frost danger is past. As the seed coat is hard and does not take up water readily, soaking it for about 24 hours (or until it splits) just before sowing will increase the rate and percentage of germination.

Only the young, tender pods are desired, as the older ones become woody and tough. If the pods are kept picked and not allowed to ripen, the harvest will be continuous from the time the first fruits develop until frost. Pods are picked when they are 3 to 4in. long and should be shaded immediately to avoid wilting.

Recommended varieties are Dwarf Green Density, White Velvet, and Clenson Spineless.

Pepper or Capsicum

There are two general kinds of pepper—mild and hot. The mild is used for salads and pickles or is baked and used as a vegetable and the hot is used for relishes, seasoning, pickles, and sauces. Popular mild varieties are Californian Wonder and Chinese Giant; the hot varieties include Long Red Cayenne and Tabasco.

The pepper plant is frost tender and therefore is grown mainly as an annual. Successful culture is generally restricted to localities where it is possible to grow sweet corn. Plants of peppers should be raised under glass the same as tomato plants and may be set out in the open toward the end of October or early in November. Peppers require a warm, sunny situation such as the base of a fence or wall with a northerly aspect. They may be planted 18 to 24in. apart in rows 3ft. apart; care is required in transplanting and the young plants should be shaded for the first couple of days.

Fertile soils well supplied with humus are desirable and in general a mixture of blood and bone and superphosphate in equal parts plus 1/20 part of sulphate of potash at the rate of 8oz. per square yard should supply the necessary fertiliser requirements.

Celtuce

Celtuce combines the uses and flavours of celery and lettuce; though belonging to the lettuce family, it is entirely different in its growth. When the plants are young the leaves may be used as lettuce or as boiling "greens," but its chief value is its central stem or stalk, which may be eaten raw or cooked. To use the stems the lower leaves, outer skin, and fibrous layers should be removed down to where they become light green and tender.

Cooked celtuce stalks have a pleasing, mild flavour suggestive of celery. Young leaves have four times the vitamin C content of mature lettuce leaves. The seed should be sown thinly ¼in. deep in rows 18in. apart and thinned to 12in. apart in the rows. The plants should be ready for use about 6 weeks from seeding.

Chinese Cabbage

Chinese cabbage is grown similarly to silver beet, the seed being sown ¼ to ½in. deep in drills about 24in. apart and the seedlings later thinned to 18in. apart in the rows. It requires thoroughly-prepared and well-manured soil and will give satisfactory results with ordinary care and attention. Heading varieties are harvested similarly to cabbage; non-heading types may be harvested any time after the leaves reach edible size.

In China the plants are pulled after the first frost and left drying in the field for a day or two. The outer leaves are then removed and the heads piled on each other in outside cellars or trenches and covered with dry straw and a layer of soil; in this manner they keep well into the winter without appreciable loss.

The best-known varieties of Chinese cabbage are:—

Chi-hi-la or celery cabbage, which resembles celery when the outer leaves are removed and has the same crisp, nutty flavour.

Wong Bok, which produces a short, thick, compact head closely packed with delicious blanched leaves.

Ptsai, the common variety, is a loose-leaf type and produces large, loose leaves similar to those of silver beet.

Winter Greens

Seed of savoy cabbage, broccoli (heading and sprouting types), cauliflower, and brussels sprouts may be sown for planting out in January and February.

Savoy cabbage: This cabbage is characterised by the intense crinkling of the leaves and is excellent for production during winter in districts where the ordinary cabbage will not heart satisfactorily.

Cauliflower and broccoli (heading types): With the exception of the early-maturing varieties of cauliflower, which have a very delicate textured curd and are liable to "button" if checked in their growth, there is little to be distinguished between cauliflower and the heading types of broccoli. The varieties can be divided into several classes; the main features are the difference in their maturing periods, which range from 3 to 4 months for the early sorts, 5 to 6 months for main crop, and 7 to 9 months for the late-maturing varieties. For successional harvesting one planting can be made of varieties with different maturity periods such as Phenomenal Early, Phenomenal 5 and 6 months, and Broccoli No. 3, which will mature in that order.

Recommended varieties: Broccoli (heading types): Late Metropole, Veitch's Self Protecting, and Broccoli Nos. 1, 2, and 3. **Cauliflower:** Early: Phenomenal Early, Early London, and Snowball. Mid-season or main crop: Phenomenal 5 and 6 months, Veitch's Autumn Giant, and Southern Cross.

Broccoli (sprouting or non-heading types): Three types of the non-heading or sprouting broccoli are Green Sprouting (Calabrese), Purple Sprouting (both early and late) and White Sprouting. The main head of sprouting broccoli is produced terminally on a fleshy, branching, elongated stalk, but besides the terminal head, longer, more slender, and smaller heads appear laterally in the axils of the leaves. Of the three classes of sprouting broccoli—green, white, and purple—the green type is the most popular. Sprouting broccoli takes from 4 to 12 months to reach maturity, according to variety. This vegetable, which may be grown with ordinary care, is an excellent subject and warrants a place in all home gardens.

Brussels sprouts: Brussels sprouts resemble miniature cabbages and are produced in the axils of the leaves along and around the main stalk, developing progressively from the base upward. For best results the plant should be grown during autumn and winter, as it prefers cool conditions. A highly-fertile soil is desirable, but brussels sprouts can be grown by most home gardeners on varying types of soil, providing excess moisture is not present. The heavier soils appear to favour the production of more firm and compact sprouts.

Recommended varieties are Scrymger's Giant, Fillbasket, and Champion.

Seed of savoy cabbage, cauliflower, broccoli, and brussels sprouts should be sown very thinly ½in. deep in well-drained, deeply-cultivated soil of good humus content, and when the young plants are about 6 weeks old they should be carefully transplanted to their permanent positions. It is important in lifting the plants not to break the taproot, and when replanting the root should not be doubled up. If weather conditions are hot, it is an advantage to trim the outer leaves.

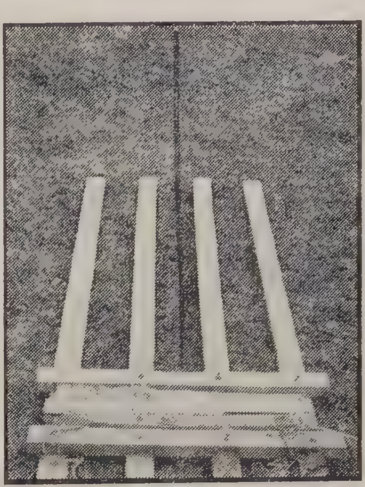
Savoy cabbage and early varieties of cauliflower should be planted 18 to 24in. apart in rows 2ft. to 2ft. 6in. apart. For main-crop cauliflower, broccoli, and for brussels sprouts which need plenty of room to develop, spacing should be 24 to 30in. between the plants and 3ft. between the rows.

Other Vegetables

Advice on the culture of beans, beetroot, carrots, cucumbers, kohl rabi, kumaras, lettuce, peas, parsnips, spinach, salsify, sweet corn, potatoes, and tomatoes was given in the September issue of the "Journal."

Sledge for Collecting Bales behind Pick-up Hay Baler

AS the machine has become available from overseas the popularity of the pick-up hay baler has increased rapidly in New Zealand in recent years, mainly because of the shortage of labour. The importance of its advent into dairy farming and its influence on haymaking in the North Island may be compared to that of the header harvester on the cropping of small seeds and cereals in the South Island. Nevertheless, though it has overcome many problems in haymaking, the pick-up baler creates minor problems of its own, the greatest of which has proved to be that of collecting bales from the paddock.



IN travelling around the field on the line of swath the baler dumps bales singly at intervals, making collection with truck or wagon tedious because of the frequent stopping and starting and the lifting of each bale up the stack on the truck. Many attempts have been made to overcome this problem—some successful, some not. Perhaps the most widely-tested of these ideas has been the trailing behind the baler of a sledge on which the bales are stacked as they emerge from the machine. This has not been wholly successful, as in most cases the sledge is too heavy and creates an excessive drag on the tractor. Unloading neatly without stopping has also presented a problem, and the disorderly heaps which usually result from dumping the bales off the sledge without stopping are almost as difficult to collect by truck as the single bales dotted over the field. The type of sledge described in this article by C. G. Jowsey, Assistant Fields Instructor, Department of Agriculture, Auckland, is considered to have overcome both these problems. The information was supplied by Mr. R. Jaggers, of Karaka North Road, Papakura, who received the details from an Australian farmer visiting New Zealand.

Construction of Sledge

The sledge consists of four 9ft. lengths of 4in. x 2in. timber spaced to give a total width of about 2ft. 6in. Two 2ft. 6in. lengths of 4in. x 2in. timber laid across the leading ends of the runners about 1ft. apart are bolted to the runners, making a light but sturdy construction. The space between the cross-pieces is decked in to form a platform.

A trace chain about 8ft. long is connected to the outer runners and carried forward to form a towing bridle. The bridle is hooked to the rear of the baler with sufficient lead to enable a man standing on the sledge platform to receive the bales from the machine and stack them on the sledge.

Method of Loading

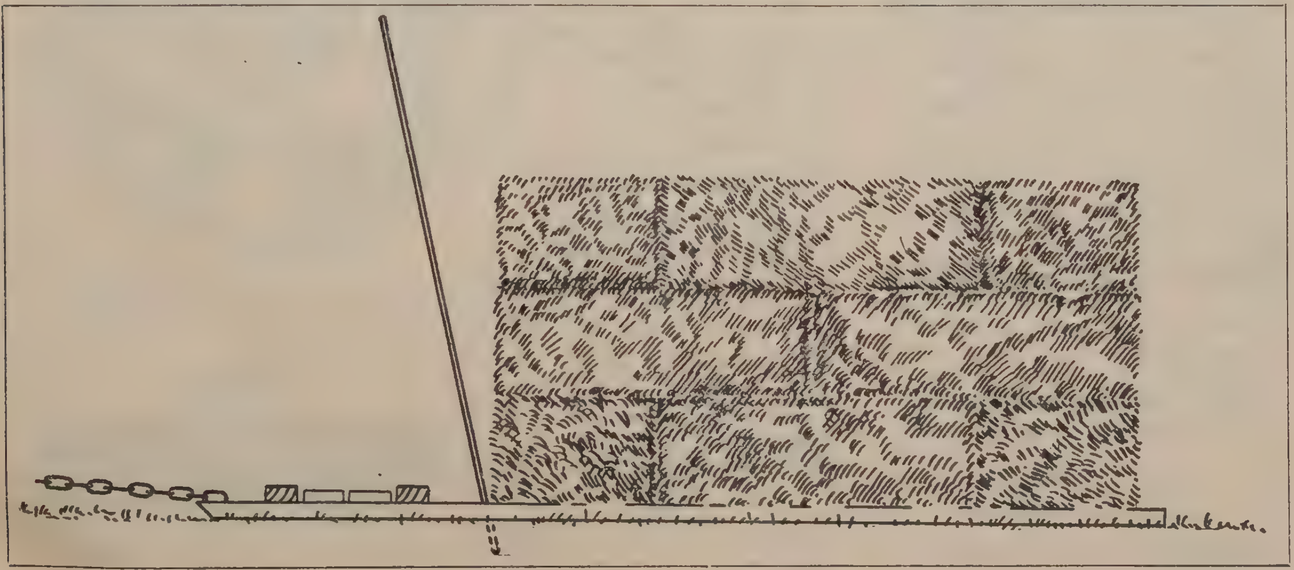
The first bale is placed across the sledge with its back edge near the trailing ends of the runners, the next two are placed end on to the first, and the fourth again laid crosswise; these form the first layer of bales. The second layer is begun with two bales on top of and at right angles to the first bale laid; the seventh and eighth bales are placed forward of these in the same manner, completing the second layer. The third layer of four bales is laid in the same manner as the first, starting at the rear of the stack.

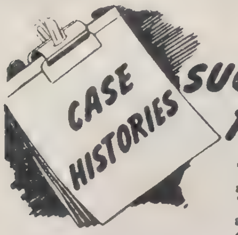
These three layers constitute a tidy stack, and when left on the paddock in this manner are easy to load on to a truck or wagon.

Unloading the Bales

To unload the bales from the sledge a crowbar is driven into the ground in front of the bottom bale and between the middle runners. The crowbar is held upright while the baler tows the sledge from under the bales, leaving them behind in a neat stack to be picked up. The drag on the baler and tractor is negligible, as the fully-loaded sledge can be drawn along level ground by one man without undue effort.

Among the advantages of the dumping sledge are that in the event of adverse weather only the top layer of bales in a stack is affected, whereas bales dotted singly over the paddock or dumped in disorderly heaps are all affected to some extent. With a little management in unloading the sledge, the stacks can be dumped almost alongside one another to form lines radiating from the centre of the paddock, making for easier collection.





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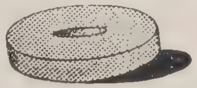

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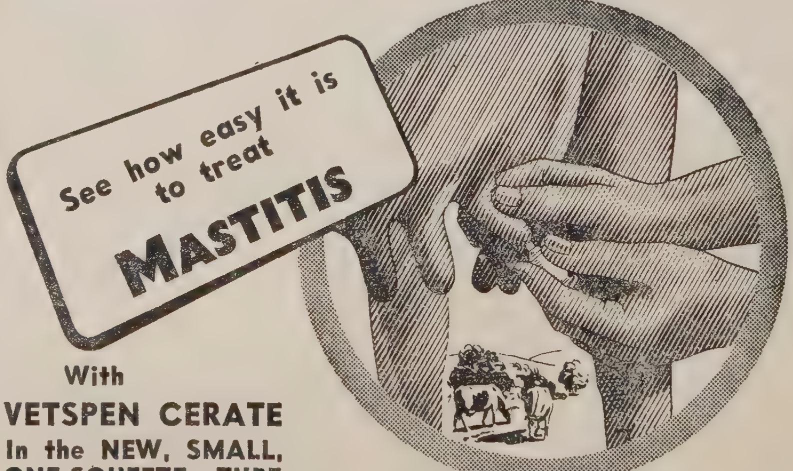
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Both sizes of tube contain the full standard dose of penicillin, plus a liberal addition to allow for wastage.

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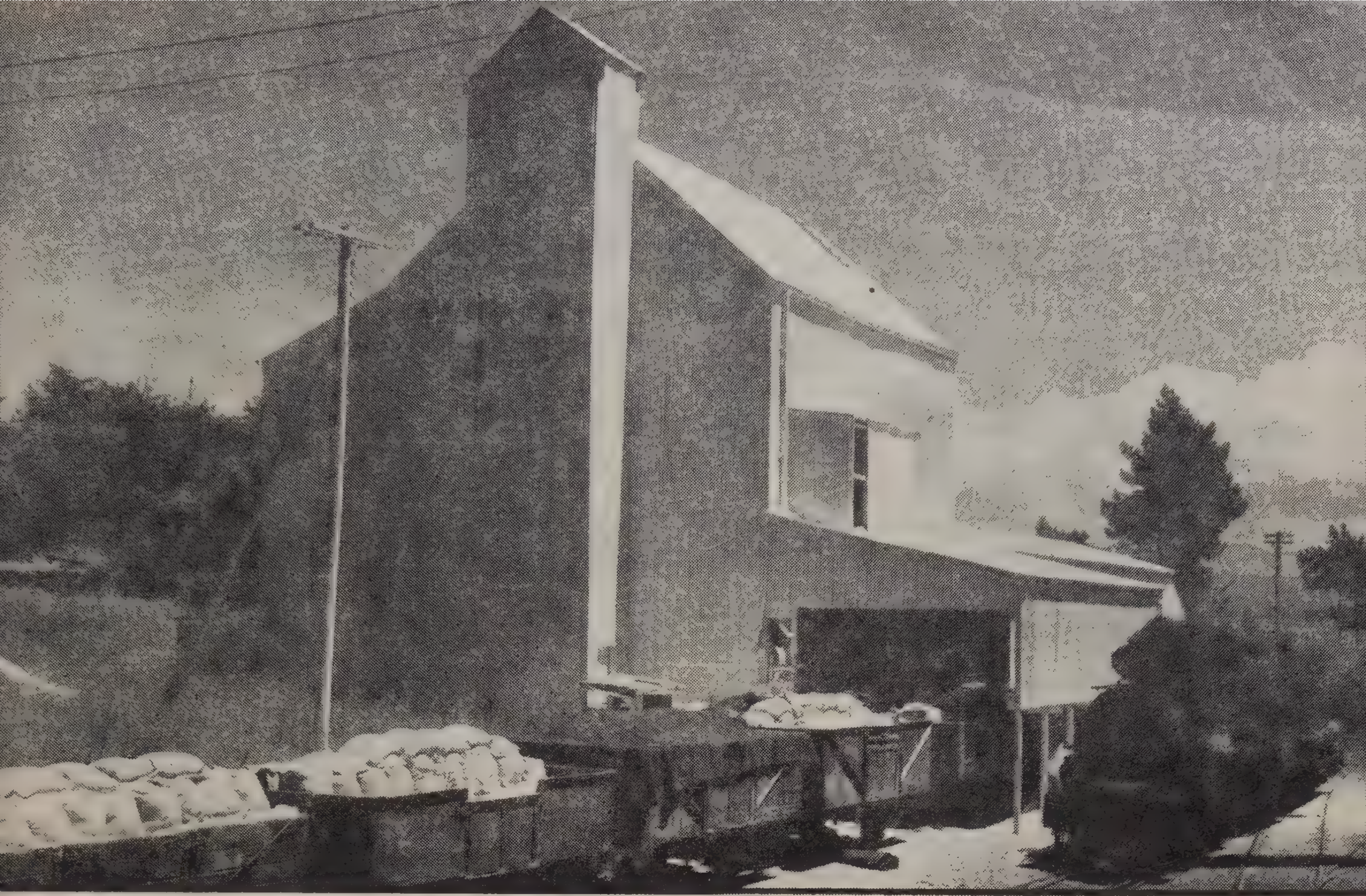

Operation of Lime Transport Assistance

EARLY this year the Minister of Agriculture appointed the 1949 Agricultural Lime Committee, to investigate aspects of the lime industry. The report of this committee was revised in minor respects by representatives of Federated Farmers of New Zealand, the New Zealand Meat Producers' Board, the New Zealand Dairy Board, and the New Zealand Dairy Products Marketing Commission, the revised report then being approved by the Government.

ARISING from this report, subsidies under the lime transport assistance scheme, with effect from July 1, 1949, are as follows:—

Rail Transport	
First 15 miles	No subsidy
Next 100 miles	75 per cent. subsidy

Note: This limitation of subsidy distance does not prevent a farmer from having lime railed more than 115 miles, but it does prevent him from receiving subsidy on the rail charges for the additional distance.

Road Transport Direct from Works to Farm	
First 3 miles	No subsidy
Next 27 miles, where rail is available	4d. per ton per mile
Thereafter, where no rail transport is available	4d. per ton per mile
Road Transport after Rail	
First 3 miles	No subsidy
Next 7 miles	4d. per ton per mile
Thereafter	6d. per ton per mile
Water Transport	
Cost up to equivalent of 15 miles rail haulage (now 3s. 8d.)	No subsidy
Thereafter	75 per cent. subsidy

In arriving at its recommendations the 1949 Agricultural Lime Committee had the benefit of written submissions from many sources, including farmers' organisations, lime millers, and Government departments. Careful consideration was given to several alternative subsidy proposals, including a cost-at-farm-gate scheme. The decision was that no alternative scheme offered advantages which would outweigh the disadvantages arising from any drastic change in the existing scheme, which had operated successfully during the past 2 years.

The funds for lime transport assistance are drawn from the Meat Industry Stabilisation Account (70 per cent.), the Dairy Industry Stabilisation Account (15 per cent.), and the Consolidated Fund (15 per cent.).

Duration of Subsidy

The present subsidy provisions, subject only to minor adjustments which may be made from time to time, are effective until July 31, 1951. It has also been decided that the question of duration will be reviewed in July, 1950, and annually thereafter, so that it is likely that lime producers and farmers who use lime will have approximately a year's warning of any significant changes in subsidies.

In accordance with a recommendation of the 1949 committee, a Lime Advisory Committee has been appointed by the Minister of Agriculture. It comprises Messrs. L. C. Scott (chairman, Department of Agriculture), W. Horrobin (Federated Farmers), G. H. Grigg (Meat Board), and A. H. Ward (Dairy Board). As occasion arises lime miller representatives may be co-opted by the committee.

Areas Remote from Lime Works

The Director-General of Agriculture, after considering the views of the Lime Advisory Committee, has extended the normal rail subsidy distance of 100 miles to enable farmers in remote areas to obtain lime by rail at subsidy rates. The ruling is that remote areas are those more than 115 miles by rail from lime works producing adequate supplies of good-quality lime. The needs of some areas are being met by extending the rail subsidy distance to 135 miles, and those of all others by extending it to 170 miles. Provision has been made for these extensions, subject to the restriction that the lime works from which the lime is consigned must be within 150 miles of the entrance points of the former areas and within 185 miles of those of the latter areas.

Heading photograph by National Publicity Studios.

OPERATION OF LIME TRANSPORT ASSISTANCE

To summarise, there are A, B, and C areas, the rail position in each case being as follows:—

Area		
A	First 15 miles	No subsidy
	Next 100 miles	75 per cent. subsidy
B	First 15 miles	No subsidy
	Next 135 miles	75 per cent. subsidy (subject to conditions set out in the note below)
C	First 15 miles	No subsidy
	Next 170 miles	75 per cent. subsidy (subject to conditions set out in the note below)

Note: The rail subsidy rates on lime for farmers in B and C areas will be the same as those for farmers in A areas if lime is consigned from points beyond the prescribed distances to the rail entrance points to B and C areas.

The B and C areas, with rail entrance points in parentheses, are as follows:—

B Areas

Taranaki (Whangamomona, from the north, and Aramoho, from the south).

West Otago (Craig Flat).

C Areas

Bay of Plenty (Katikati).

Poverty Bay (Waikokopu).

West coast of the South Island (Arthur's Pass).

Central Otago (Middlemarch).

The boundaries of B and C areas may be altered, or the special provisions applying to B and C areas may be removed, at any time. The entrance point or points to any area may also be altered as occasion arises. The west coast of the South Island area is to be reviewed at the end of the present year.

The Bay of Plenty position illustrates the principle on which extension of rail subsidy distance is based. This area has no lime deposits and the railhead at Taneatua is 185 miles from Otorohanga, which is the nearest source of adequate lime supply. Lime railed from Otorohanga to Taneatua will carry full subsidy. Railage on lime from further afield (for example, Te Kuiti, 12 miles beyond Otorohanga) is subsidised to a point correspondingly short of Taneatua, provided the dispatching point is not more than 185 miles from the entrance point, Katikati.

Quality of Lime

The Department of Agriculture makes regular analyses of lime supplied under Lime Transport Assistance and it expects shortly to be able to formulate a simple system of lime evaluation which will enable direct comparisons to be made between limes which have varying calcium carbonate content and which are ground to varying degrees of fineness.

Sacks

There are wide variations in the charges for sacks, the charges ranging from 2s. 6d. to 5s. 4d. per ton. In the majority of cases where sacks are supplied by the lime works the charge is covered by debiting the sacks at, say, £1 2s. 6d. and crediting them on return at, say 17s. 6d., which automatically covers the hire charge and tends to ensure the return of the sacks. Farmers endeavour to avoid heavy hire charges by supplying their own sacks, but dispatch operations are complicated when some orders involve supply in farmers' sacks and others in lime works' sacks. A lime works dispatching a substantial portion of its output in farmers' sacks sooner or later has to charge for handling sacks. Farmers can reduce hire charges by taking care of sacks and returning them promptly.

Production and Distribution

In 1940 lime production reached 594,000 tons, but by 1948 this had increased to 1,120,000 tons. Today production capacity is estimated at 1,800,000 tons and is tending to expand. Increased demand should be met by increased efficiency. Recent experience shows that the "rooting" method of rock extraction could well be extended in suitable places, as it speeds up production and costs less than common quarrying methods. There is also still scope for the use of more portable plants to serve local needs for low-cost lime, and the use of bulk lime delivery and spreading equipment could be further expanded. There is now a bulk lime service in areas within reasonable road distance of many lime works. It is hoped that this type of service will be developed in more distant areas. The limiting factor at present is portable equipment capable of transferring bulk lime from rail wagons to lorries, but there are indications that it will not be long before substantial quantities of lime will be railed unbagged.

Stock Piles

Though in the South Island the demand for lime is fairly steady throughout the year, in the North Island it is more seasonal. The accumulating of lime in stock piles in the off season appears to offer reasonable prospect of reducing the peak demand. During February, March, and April North Island demand greatly exceeds rail-delivery facilities and to encourage stock piling the following transport assistance provisions will be available in approved cases:—

The ordinary rail subsidy from the lime works to the stock pile.

The ordinary 4d. per ton per mile road subsidy from the stock pile to the farm gate, but with a 20-mile subsidy limit (that is, 23 miles reduced by the usual 3 miles on which no subsidy is paid).

An extension of the 20-mile subsidy limit in cases where the farm is not within 23 miles of the rail.

Provided a stock pile can be built up in the off season and bulk delivery can be given from it, the lime cost ex stock pile should compare favourably with that of bagged lime ex rail. If plant costs for either the handling or the housing of the lime are too high, it will be difficult to keep the bulk price ex stock pile competitive with the price of bagged lime ex rail. If the price is right, demand should be assured, provided that suitable spreading equipment is available in the district and that delivery and spreading activities are suitably co-ordinated.

Butterfat Production for 1948-49 Season

FOR the year ended June 30, 1949, the Extension Division of the Department of Agriculture estimates that the total butterfat produced in New Zealand was 460,000,000lb. This is the second highest production figure recorded, the highest being 467,000,000lb. in 1940-41.

CONDITIONS in 1948-49 were very favourable throughout the Dominion, but despite this the increase of 40,000,000lb. of butterfat over the preceding season is not due alone to increased production per cow. The number of cows milked as at January 31, 1949, is estimated provisionally by the Department of Agriculture to have increased by 26,000, compared with the figure at January 31, 1948. Average production per cow is estimated provisionally at 261lb., compared with 242lb. in the 1947-48 season.

Production figures for 12 seasons are shown in the following table, the figures being compiled from Census and Statistics Department data except where otherwise indicated:—

Season ended June 30		Creamery butter* tons	Factory cheese* tons	Total butterfat million lb.	Cows milked as at January 31 thousands†	Average butterfat per cow lb.
1937-38	..	164,100	88,400	436	1,764	247
1938-39	..	144,700	85,100	401	1,744	230
1939-40	..	155,700	97,800	432	1,740	248
1940-41	..	161,900	122,400	467	1,780	262
1941-42	..	129,100	157,500	438	1,777	246
1942-43	..	138,700	101,800	408	1,736	235
1943-44	..	134,400	91,700	389	1,669	233
1944-45	..	151,600	103,500	433	1,700	255
1945-46	..	123,900	94,500	374	1,682	222
1946-47	..	143,700	91,400	410	1,678	244
1947-48	..	149,000	86,300	420	1,734	242
1948-49	..	163,100	99,500	460‡	1,760‡	261‡

* Department of Agriculture figures, to nearest 100 tons (excluding whey and farm butter).
† To nearest thousand (including those in cities and boroughs).
‡ Provisional estimates made by the Extension Division of the Department of Agriculture.

FARMING IN NEW ZEALAND

Malvern County

By J. D. STEWART, Rural Field Cadet, Department of Agriculture, Christchurch.

MALVERN COUNTY is part of the great alluvial plain of Canterbury, formed by large, snow-fed rivers discharging vast quantities of greywacke shingle in front of the gorges which they have cut into the eastern slopes of the Southern Alps. The upper deposits consist of large bouldery material, followed by finer and finer debris as the plain slopes gently to the sea. The land is generally flat, the soils shingly, and the annual rainfall about 25in. Because of these conditions, farming systems have been based on short-rotation pastures and the growing of fodder crops for the production of fat lambs, together with the raising of cereal and other cash crops on the more fertile areas. The landscape is one of large fields, patterned by pasture, annual crop, and fallow and divided by mile upon mile of gorse hedges and long, straight roads. Away from the main rivers there is no surface water, and drinking water for livestock is supplied from the rivers by means of water races. Dry soils and summer droughts limit the intensity of farming and the mean carrying capacity of the grassland is slightly above 1 ewe per acre.

THE county, of which 147,000 acres are occupied, is bounded in the north by the Waimakariri River, in the south by the main road between the Selwyn River and Burnham, in the south-west by the Selwyn River, in the west by the Malvern Hills, and in the east by the Burnham-Sandy Knolls-Halkett road. The foothills region comprises about a tenth of the total area; Sheffield near the base of the hills is 1000ft. above sea level and the highest points further inland in the county have an altitude of from 2000 to 2500ft. The Malvern Hills are of some economic importance apart from their agriculture, as they produce lignite coal and a fairly high grade clay.

The plains area of the county is in the 20-30in. rainfall belt, but further into the foothills rainfall averages 40in.

The average rainfall over a 20-year period for stations in or near Malvern County is as follows:—

	Inches
Darfield	29.42
Coalgate	33.42
Hororata	29.79
Burnham	28.00

This precipitation is fairly evenly distributed, but its effectiveness varies greatly, as in December and January strong north-west winds and dry conditions frequently cause excessive evaporation. This factor makes the county ideal for the growing of cash crops, because the dry conditions help to ripen cereal and pulse crops and are favourable for harvesting.

The yearly variations from average rainfall figures are quite marked and these fluctuations are of great importance to the farming of the county. For instance, while the average for Darfield is 29.42in., the precipitation was 35.16in. in 1944, 43.04in. in 1945, 36.83in. in 1946, and 31.94in. in 1947.

Dry seasons may suit farmers on the colder, wetter foothills, but those on the shallow, stony, or sandy plains land are adversely affected by the cumulative effect of drought, grass-grub, and porina grub. On the other hand, wet seasons are detrimental to the health of stock on the cold downs, but are welcomed by the farmers on the stony soils of the plains.

Rainfall is variable during the most critical months—November to March. It is during this period that the crops ripen and are harvested and the land is prepared for the sowing of winter forage crops and autumn-sown pastures and cereals. Fluctuations in rainfall during these months obviously affect the whole farming programme and rapid changes in the cropping programme and stock management may be necessary. Very wet seasons often make fattening of lambs difficult, as rape crops tend to be fleshy and lambs unthrifty. Reserves of feed, good hay or oaten chaff, may have to be used for fattening lambs. An advantage of a dry summer is that it facilitates the killing of twitch, which is one of the big problems of the arable cropping area. A good kill may be obtained by summer fallowing and keeping the twitchy clods worked about and turned to the sun.

The average annual temperatures in Malvern County are from 53 to 57 degrees F., with a mean monthly minimum of 44 degrees and a mean monthly maximum of 61 degrees. As winter temperatures preclude pasture growth, some form of supplementary feeding is required for about 100 days.

Generally the climate of Malvern County is conducive to the rearing of

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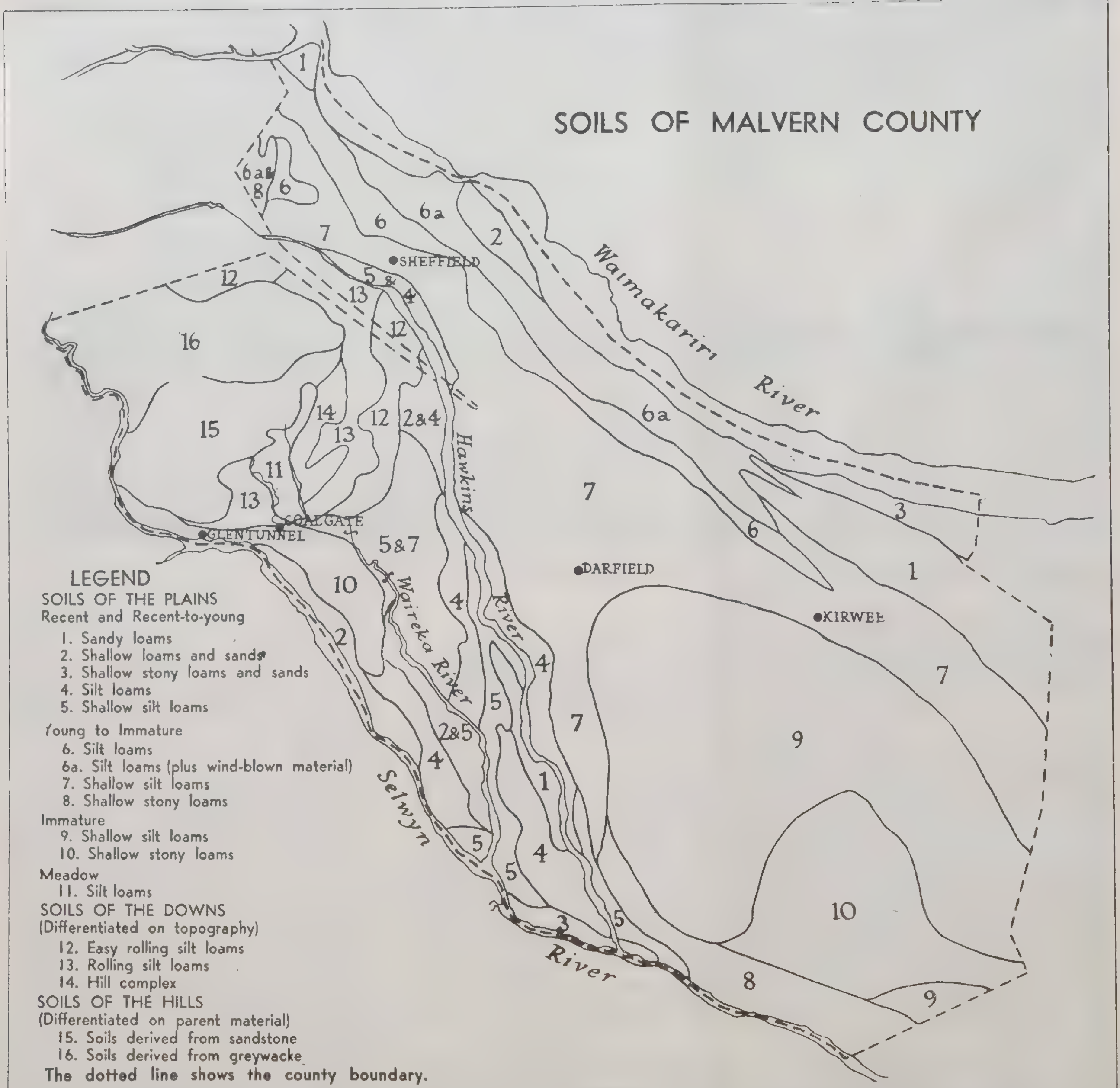
Heading photograph by Green and Hahn Ltd.


SOILS OF MALVERN COUNTY
Waimakariri River
Hawkins River
Waireka River
Selwyn River
SHEFFIELD
COALGATE
GLENTUNNEL
DARFIELD
KIRWEE
LEGEND
SOILS OF THE PLAINS
Recent and Recent-to-young
1. Sandy loams
2. Shallow loams and sands
3. Shallow stony loams and sands
4. Silt loams
5. Shallow silt loams
Young to Immature
6. Silt loams
6a. Silt loams (plus wind-blown material)
7. Shallow silt loams
8. Shallow stony loams
Immature
9. Shallow silt loams
10. Shallow stony loams
Meadow
11. Silt loams
SOILS OF THE DOWNS
(Differentiated on topography)
12. Easy rolling silt loams
13. Rolling silt loams
14. Hill complex
SOILS OF THE HILLS
(Differentiated on parent material)
15. Soils derived from sandstone
16. Soils derived from greywacke
The dotted line shows the county boundary.

[*Map drawn by the Head Office, Department of Lands and Survey, Wellington; base data supplied by the Department of Lands and Survey and soil data by the Soil Survey Bureau, Department of Scientific and Industrial Research, Christchurch.*

good, healthy stock and to the growing of cereals and pulse crops for threshing.

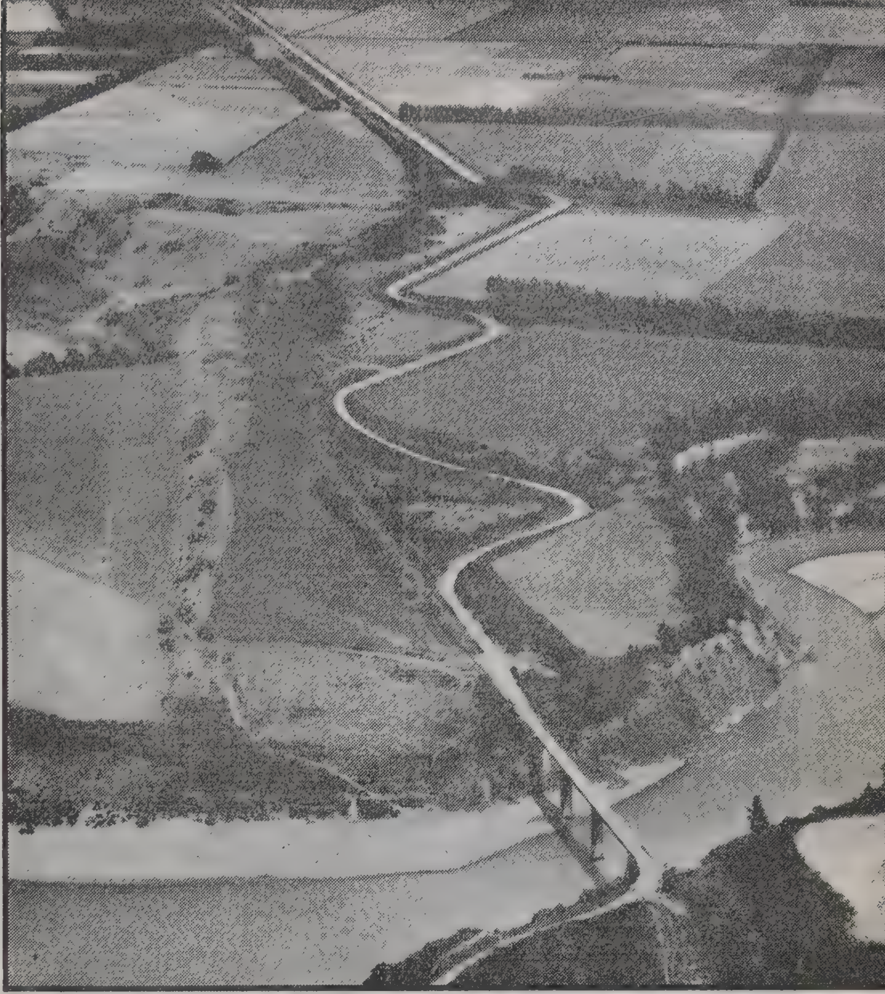
Soils

About nine-tenths of Malvern County is greywacke, alluvial, and wind-blown deposits, which have given rise to soils of varying degrees of maturity; the remaining tenth consists of soils developed from the ancient wind-borne material, which forms a blanket covering the downs, or soils developed on steep greywacke and sandstone. Fifteen soil series comprising about 50 soil types have been mapped in the county, but for the small-scale map accompanying this article it has been necessary to group many soil types, which leaves the 17 units shown.

The recent and recent-to-young soils are those found on alluvial and wind-blown deposits laid down in very recent (geologically) times. There has been little or no development of profile other than the addition to the top few inches by decomposing plants of a small amount of easily-exhausted humus matter. Because these soils are of a very recent origin, there has not been time for impoverishment by the leaching away of plant foods such as lime, potash, and phosphate. Topsoils are dark grey to brownish grey and subsoils are slate grey to brownish grey.

Group 1 soils are sandy loams greater than 18in. deep to the underlying stones. They are capable of growing payable crops of wheat, oats, barley, and peas and of retaining quite high-producing short-rotation pastures of perennial ryegrass and white clover. If maintained in good heart, this land will yield up to 50 bushels of wheat and 30 to 35 bushels of peas per acre.

Group 2 soils consist of sandy loams 12 to 18in. deep and support a type of farming similar to that carried on on group 1 soils. A limiting factor



[*V. C. Browne photo.*

Gorge bridge, Waimakariri River, which was erected by the Canterbury Provincial Council in the 1870's. The country shown, which is between Sheffield and Oxford, is some of the most fertile land in Malvern County.

with both these groups of soils is that, each being a readily-drained layer of sandy loam overlying gravel, they dry out quickly in a dry season, group 2 naturally drying out more quickly than group 1.

Group 3 soils are shallow, stony loams and sands in which the total depth to stones is less than 9in. This group is affected severely by dry conditions, and cropping is not a feature on this land, which is used mainly for grazing.

Group 4 consists of deep, fertile, moisture-retentive silt loams underlaid by gravels at more than 18in. from the surface. Group 5 soils are similar except that the total depth of soil is only 9 to 18in. and consequently they dry out more readily than group 4. The land in the two groups is very adaptable, being well suited to the production of wheat, oats, barley, peas, potatoes, and linseed and the growing of forage crops and lucerne. High-producing short-rotation pastures are maintained. There are few cultivation problems, but care must be taken when preparing land for an autumn-sown cereal to ensure that it is not worked down too fine, because in that condition it will run together during the winter and will bake and crack when exposed to hot sunshine. On this land it is essential to sow on a relatively rough seed-bed, allowing the weather and frosts to break down the land, and to roll or harrow the crop in the spring if necessary.

The young-to-immature alluvial soils are a little older geologically than those already mentioned and, since the soil-forming factors have been in operation for a longer period, there has been some loss of plant nutrients by leaching. Concurrent with this process there has been a steady sprinkling of unleached, wind-borne dusts from the riverbeds, which has tended to keep the fertility at a high level. Topsoils are grey-brown and subsoils yellow-brown.

Group 6 is silt loam of average fertility greater than 18in. deep. Group 6a is similar except that the topsoil is up to 18in. deep, while with group 7 stones are found at 9 to 18in. from the surface and the soils in this group are therefore correspondingly drier and less productive. All the land in group 7 is medium cropping land which will yield up to 40 bushels of wheat and, if it is well managed, will hold a good pasture for 5 to 6 years.

Group 8 soils are shallow, stony loams 6 to 9in. in total depth and very droughty. The ability of this land to grow cereal crops economically is limited unless fertility can be built up sufficiently by good management. Frequently, hot, dry, north-west winds burn off the pasture in summer, and attacks on pastures by grass-grub and porina grub are common.

Group 9 soils, immature alluvial soils, are the oldest geologically on the plains, having been exposed to the leaching action of downward percolating rain-water for the longest time. They have the lowest plant food content. Topsoils are brownish grey to light-greyish brown and subsoils are brownish yellow to greyish yellow. The lime requirements of this group are greater than any other in the county.

Group 10 is similar to group 9 except that fertility is lower, because soils in the group are shallower and more stony and tend to dry out badly in summer and autumn. Groups 9 and 10 comprise approximately one third of the area of the county. Like the soils of group 8, they will not grow cereal crops economically unless fertility is built up. Summers usually are dry and pastures are frequently dried off by hot, north-west winds. The area covered by groups 8, 9, and 10 is used for sheep grazing, the predominant pasture sward comprising browntop, sweet vernal, and hair-grass. Where fertility is being built up and subterranean clover is sown with the pasture mixtures productivity is being raised.

Meadow soils (group 11) occur in the Waireka Valley. They are fertile silt loams 3ft. or more deep with the water-table near the surface, which presents drainage problems and both open and mole drains may be used with advantage. The valley will grow good crops of grain, but conditions are wet enough to make cereal crops a risky venture and the land is better suited to the growing of permanent pasture for dairy cows.

Spring sowing is usual when cash cropping is practised, barley fitting into the programme admirably.

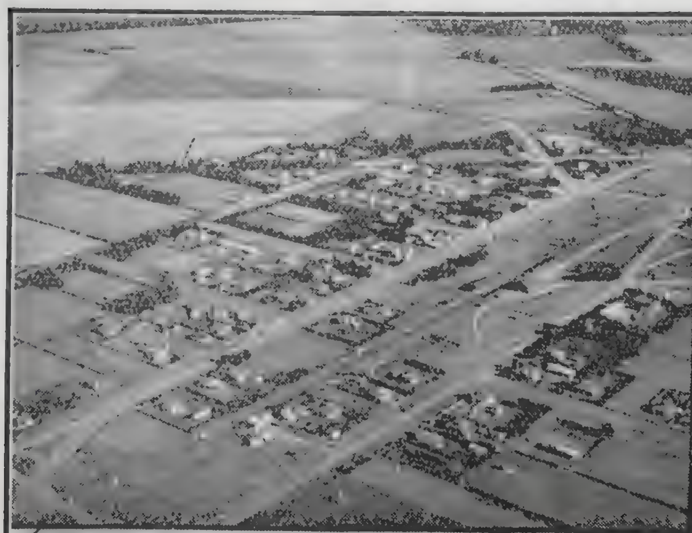
Down soils developed from loess-like beds are, for present purposes, divided on the basis of topography only. Group 12 consists of easy rolling silt loams of medium fertility and heavy, mottled subsoils, wet in winter and somewhat droughty in summer. Group 13 soils are similar except that they are on rolling country. Group 14 soils are hilly and contain areas of chocolate-coloured volcanic ash soil. The down land, where it can be cultivated efficiently, will grow reasonable wheat crops and crops of oats and linseed and it will hold fair pastures of English grasses. The unploughable areas in the main carry poor swards of crested dogstail, danthonia, and browntop.

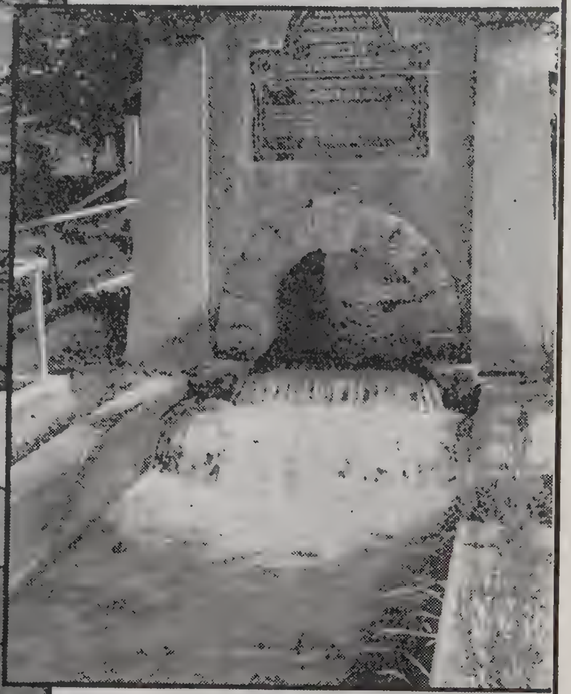
The soils on the steeper hill country have been divided into two groups on the basis of their parent substance. Group 15 is made up of low-fertility sandy loams developed on sandstone and group 16 of low-fertility skeletal soils of greywacke origin with unweathered fragments of rock throughout the profile. The hill country is devoted to extensive sheep farming. The cover comprises danthonia, browntop, and tussock and there are considerable areas of gorse and scrub.

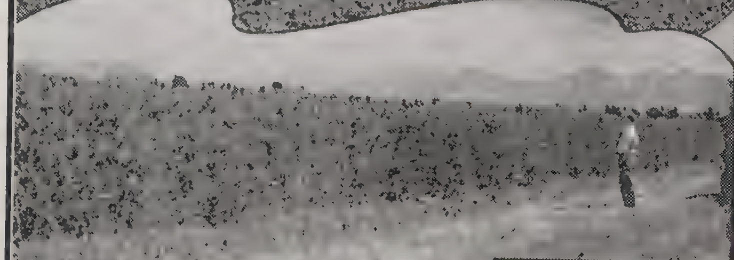
Land Utilisation

The relationship of crops to pasture in the production of meat and wool is shown in Table 1, which indicates that the grassland of the county has a mean carrying capacity of 1 1/6 ewes per acre and that 14 acres of fodder crops are required for each 100 ewes. Cash crops occupy about the same area as forage crops.

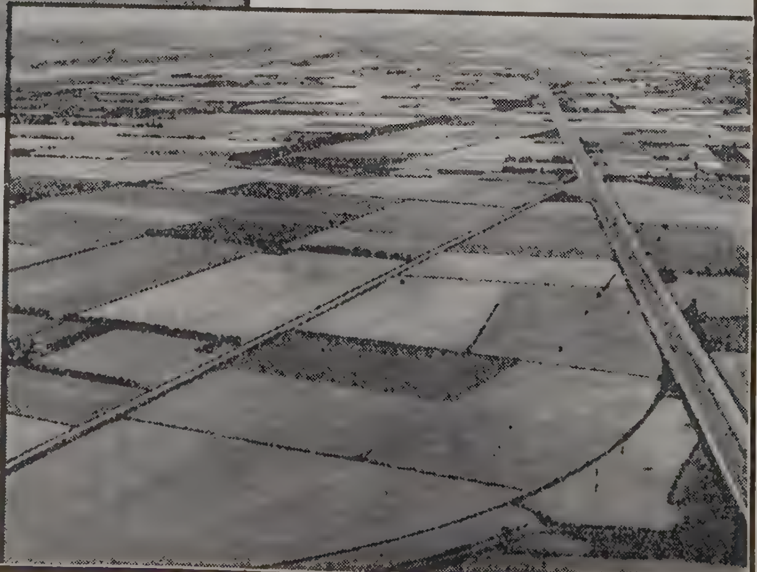
MALVERN COUNTY ON THE CANTERBURY PLAINS







Above—Water for stock is supplied from the rivers by water races. The illustration shows the main race and the memorial to one of the pioneers of the scheme. Below—Looking south toward Sheffield and Darfield. The plain presents a pattern of rectangular fields, long, straight roads, and gorse hedges.



Upper—Darfield, the administrative and business centre of Malvern County. Middle—Lambs fattening on rape. Up to 8000 acres of rape are grown each year in Malvern County, representing between a third and a half of the total area devoted to forage crops. Most of the soils of the county are very suitable for rape and on the better classes of land up to 15 lambs per acre can be fattened on it in an average season. Lower—Well-kept gorse hedges, which provide good, low shelter for stock, are a feature of the farms in Malvern County.

[*Photographs at top left and bottom right by V. C. Browne; others by Green and Hahn Ltd.*

TABLE 1—LAND AND LIVESTOCK, MALVERN COUNTY, 1946-47*

Land under occupation—	Acres
Sown grasses, clovers, and lucerne	93,479
Cash crops	16,983
Fodder crops	17,489
Fallow land	3,787
Plantations, orchards, gardens, etc.	4,410
Unimproved land	15,016
Native grasses and tussock land	13,608
Total area occupied	147,226
Livestock—	Total
Breeding ewes	†124,076
Total sheep	†196,176
Total cattle	‡2,446

* Statistical Report on the Agricultural and Pastoral Production of New Zealand.
† As at April 1. ‡ As at January 31.

Crop Production

About five-sixths of the county is devoted to mixed arable farming the object of which is to establish and maintain a balance between the area in crops, the area in grass, and the stock carried. To attain this balance cropping rotations are developed. These vary greatly according to the type of land, but the aim always is: 1, to achieve maximum net returns; 2, diversify production and minimise risk; 3, maintain or build up soil fertility; 4, provide supplementary forage crops for stock; and 5, control weeds.

On the better-class land, which is capable of growing a wide variety of crops, a multiplicity of rotations and cultivation practices is possible. On the lighter country (groups 8, 9, and 10), where there is always a risk of wind erosion and where the soil is readily depleted if not handled well, rotations are generally simple and short.

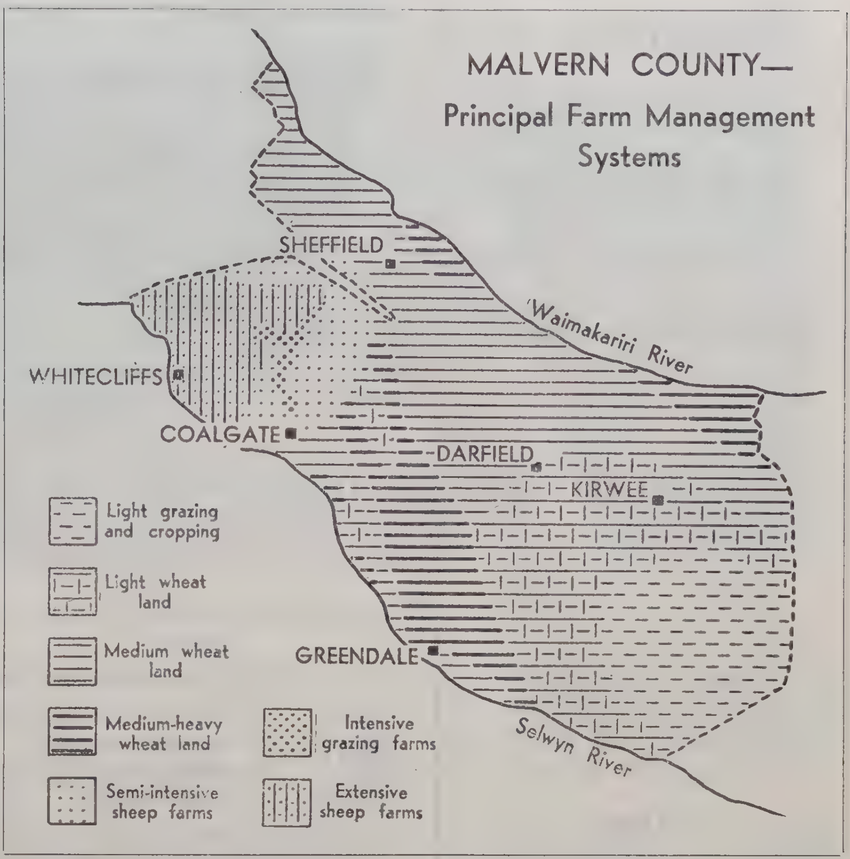
Cash Crops

Wheat: The acreage in wheat has fluctuated violently over the past 20 years. Generally, however, it has been sown in two-thirds of the area devoted to cash crops and accounts for about a third of the total area cropped. Wheat may be fitted into a rotation at almost any stage, but because its fertility requirements are high, in Malvern County it usually follows pasture or a fed-off forage crop (for example, rape) out of pasture.

In 1921-22 the area of wheat grown in Malvern County reached the relatively high figure of 16,400 acres, which was a result of the depression, farmers finding that grain, which was not so dependent on overseas markets, commanded a readier sale than meat. In 1941-42 the same figure was again reached through farmers responding to war requirements.

When overseas markets for frozen meat have been good wheat acreages have fallen. In 1924-25 only 9300 acres were grown and in 1946-47 only 9200 acres. Unfortunately in the past it has been most difficult to forecast the market situation and adjustments in farm practices have tended to lag behind economic trends. Originally 75 per cent. of the area in wheat was of the Solid Straw Tuscan variety, but since the introduction of Cross 7 the latter variety has rapidly replaced the former.

Oats: The area in oats for threshing declined from nearly 6000 acres in 1920-21 to 2000 in 1946-47. The decline has been fairly steady and marked fluctuations usually coincide with fluctuations in total cash crops. The change from horses to tractors accounts for most of the reduction, while the increased use of alternative crops (peas and, on the deeper sandy and deeper silt loams, barley) is also a factor.



Oats yield a more payable crop on lighter land than wheat and even on the lightest land of the county, that about Burnham (soil groups 9 and 10), occasional crops are grown, yielding on an average 35 to 45 bushels per acre. On this land oats are usually autumn sown after grass and the land is immediately grassed down under a cover crop after the cereal crop has been taken.

On the deeper sandy and silt loams of the county oats will yield up to 60 bushels and good crops on the best land over 70 bushels. The crop may be either autumn sown or spring sown. When autumn sown oats may follow grass ploughed early, rape, or, if the land is in good heart, wheat. When spring sown oats may follow turnips or wheat stubble or may be grown on land ploughed out of grass in winter. Seed-bed preparation is similar to that for wheat. When oats are autumn sown the object is to establish a seed-bed fairly fine underneath and relatively rough on top.

Uneven ripening and the possibility of shaking make it unwise to attempt to direct head oats, especially as most of this county is subject to strong north-west winds. The crop may be picked up from windrows, but it is more usual to stack it and thresh from the stack.

An advantage of threshing is that the oat straw is saved and this provides a useful reserve of feed against a severe winter.

As tractors have steadily replaced horses for draught on the arable farms the area devoted to growing oats for chaff declined correspondingly from 9891 acres in 1920-21 to 2077 acres in 1946-47. In the same period tractors increased from 5 to 264. This latter figure represents almost 2 tractors for every 3 holdings. The most rapid decrease in the area of oats grown for chaff was in the years 1940-48, when increased mechanisation was a feature of farming in Canterbury. However, chaff still has its uses and it is an excellent supplement to turnips as winter feed and rape as lamb-fattening feed. There is also a ready demand for chaff from racing stables near Christchurch.

Peas: The acreage devoted to the growing of peas was relatively small until the beginning of the war, when good prices attracted more growers. The area in peas increased from 1173 acres in 1939-40 to 2441 acres in 1946-47. The land suitable for growing peas in the county is limited, a fairly deep, free-working loam being required. In this respect soil groups 4, 5, 6, and 6a are ideal. Peas usually follow grass in the rotation. The land is ploughed, deep worked through the winter, and top worked before sowing, usually in October, but sometimes late in September. Field peas mainly are grown, the Partridge variety being the most popular. An average crop will yield 30 to 35 bushels per acre.

After peas the land is in good heart and does not require much cultivation before being planted with an autumn-sown cereal.

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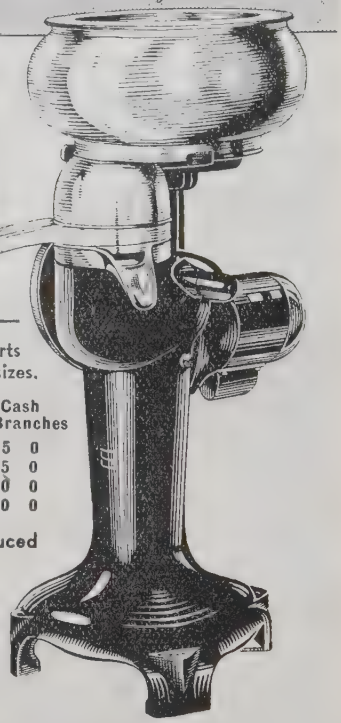

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PRODUCTION OF CROPS IN MALVERN COUNTY

[*Green and Hahn Ltd. photo.*

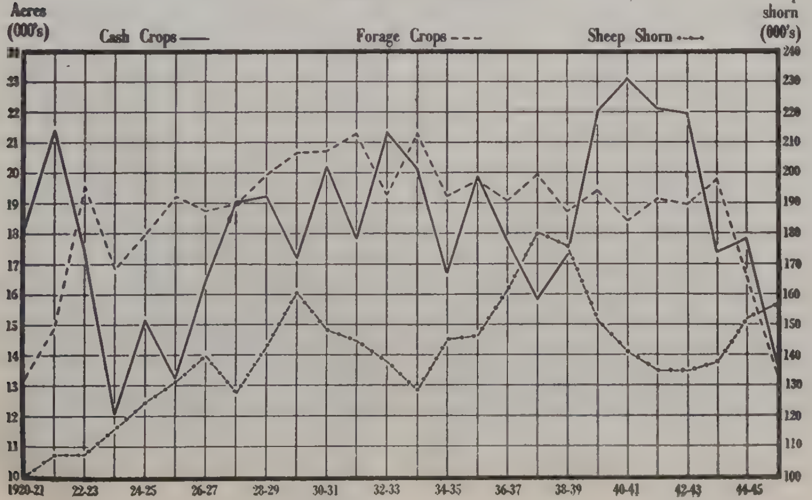
A potato crop in the Annat district, one of the areas which is noted for the production of very fine seed.

Barley: The area in barley showed a steady increase from 222 acres in 1934-35 to 1167 acres in 1940-41, declined to 400 acres in 1943-44, but then rose sharply again, to reach 1708 acres in 1946-47. The decline from 1940-41 to 1943-44 corresponded with a general decrease in cash crops and the sharp rise in 1945-46 was probably the result of a wet season precluding the sowing of autumn wheat in some areas, the land being sown in barley in the spring. Barley may serve a useful function in Malvern County, where autumn sowing of wheat is necessary, but is sometimes difficult. The fertility, cultivation, and seed-bed requirements of barley are similar to those for peas.

Potatoes: The area in this crop has never exceeded the 900 acres grown in 1943-44, when war conditions induced a keen demand. The number of growers is fairly constant and usually small fluctuations in the potato acreage merely reflect changes in the acreage on individual farms.

Potatoes are expensive to grow and harvest and to reduce costs per ton growers take steps to secure the best yields possible. Highest yields are obtained when the crop follows a good, vigorous pasture or a ploughed-in green-manure crop. Early ploughing and the working up of a deep, loose seed-bed are the aim. Potatoes more than any other crop respond to cultivation after planting. When the crop has been taken out, usually in May, a minimum amount of working is necessary to prepare the ground for a cereal. The fertility requirements of potatoes are high and in Malvern County the most suitable areas for them are the soils of groups 1, 2, and 4 to 7.

CROP AREAS AND SHEEP NUMBERS, MALVERN COUNTY, 1920-21 to 1944-45



The Halkett, Courtenay, Kimberley, Sheffield, and Annat districts are noted for the production of very fine potato seed. The altitude, the prevalence of dry, north-west winds, and the absence of serious aphis infestation ensure clean, disease-free seed.

Linseed and linen flax: Up to 236 acres of linen flax were grown in Malvern County during the war, when a factory operated at Oxford a few miles outside the county. The area in linseed for threshing showed an increase from 27 acres in 1944-45 to 590 in 1946-47. Crops are grown on contract to a firm processing the seed for oil.

Lupins: Lupins are becoming increasingly important in the county not only as a fodder crop but as green manure and a seed crop. On the shallow and stony soils of groups 8, 9, and 10 lupins are very often sown with turnips for winter feed or with rape for lamb fattening. Depending on the season, portion of the lupin crop may be saved for seed, either as a cash crop or merely to provide seed for the following season.

Forage Crops

The total area in forage crops has not fluctuated to the same extent as that in cash crops, being usually from 18,000 to 20,000 acres. Generally the variation has followed the same lines as total sheep numbers, except during depressions, when forage crops have reached a peak and sheep numbers have decreased correspondingly. This has been due to the fact that the market for store stock has collapsed, which makes it essential for farmers to fatten their stock.

The fact that up to 8000 acres of rape are grown each year, representing between a third and a half of the total area devoted to forage crops, shows the reliance placed on rape as a lamb-fattening crop.

[*Green and Hahn Ltd. photo.*

A crop of rape in the Waddington-Sheffield district. In Malvern County great reliance is placed on rape as a lamb-fattening feed.

Most of the soils of the county are very suitable for the growing of rape and on the better classes of land up to 15 lambs per acre can be fattened on it in an average season. However, it is not altogether reliable, as on the heavier land in wet seasons it tends to become watery and fleshy, causing lambs to scour, while on the plains hot north-west conditions often cause crop failures.

Hard turnips each year occupy an acreage similar to rape. Usually they are sown about Christmas and New Year for winter feeding of sheep. Supplemented with hay or chaff, turnips supply a reliable fodder for carrying ewes through the long winter. On the soil groups 1 to 7 in an average season 1 acre of turnips would carry 400 ewes for 1 week if the ewes were turned on to the turnips for 4 to 6 hours per day and given a run off.

On the stony and shallower soils rape and turnips may be sown together, the object being to reduce the risk of crop failure. Usually 200 to 300 acres are sown each year.

During the last 7 years swedes have become fairly popular along the colder foothills country, up to 500 acres being sown. Swedes are more reliable and heavier yielding than turnips on this colder, clay country.

Turnips and swedes are usually sown on land ploughed out of grass in the winter or they may be sown after a previous crop of turnips or a spring cleaning fallow after a cereal.

There has been a marked increase in the quantity of chou moellier and kale grown: From less than 100 acres in 1939-40 to 1360 acres in 1946-47. On the light country of soil groups 8, 9, and 10 kale has become increasingly popular as a lamb-fattening crop, being more resistant to dry summers. Since 1940-41 the practice of sowing chou moellier with turnips and swedes has also developed. This minimises the chance of crop failure and provides a more-balanced and bulkier diet. The kale is often sown with new grass, to which in the initial stages it affords protection from hot winds.

Because pasture growth is relatively late in Malvern County, greenfeed crops, of which about 3000 acres are grown annually, are of great importance, especially in starting off milking ewes. Ewes are frequently lambed on the greenfeed or, alternatively, are drafted on to it as they lamb. Throughout September and up to the time when grass is coming away ewes and lambs are carried mainly on greenfeed crops. Oats, which are sown in the early autumn on a fairly rough seed-bed, have been the most common greenfeed crop, but they are beginning to be replaced by Italian ryegrass. Considerable use is also made of short-rotation ryegrass.

Hay: Though the area saved for meadow hay has seldom exceeded 1000 acres, lucerne hay is gaining steadily in popularity and appears to have excellent possibilities on soil groups 1 to 6a. In fact it can be grown with advantage on all classes of soils in the county, including the very light land in groups 8 to 10. The area cut for lucerne hay increased steadily, from 27 acres in 1927-28 to 366 acres in 1945-46, and was 691 acres in 1946-47. Most of the crops yield 3 cuts of about 1 ton per acre each year. Most of the crop is baled and stored for winter use. Lucerne is usually sown in early summer on a well-limed, well-prepared seed-bed.

Pasture Production

Soil and climatic factors make for short growing seasons and short-lived pastures in Malvern County and grassland is not highly productive. White clover has a short growing season and its summer and winter production is light and perennial ryegrass ceases to produce fairly early in the dry seasons. Pastures, if not managed carefully, quickly revert to browntop, danthonia, hairgrass, etc.

Comparison of the figures for the area in sown grasses over several years with the number of breeding ewes for the same years shows that there has been quite a substantial increase in the carrying capacity of the sown areas. In this respect increased use of lime has had an important influence. Though the area in sown grasses showed little change from 1925 to 1930, the number of breeding ewes increased by 40 per cent. from 83,700 to 117,225. This improvement can be attributed partly to increased topdressing with lime, as in the period mentioned the quantity of lime handled at the four officered railway stations in the county increased from 210 tons to 1050 tons. During the slump, when farmers were experiencing financial difficulty, the figures did not increase.

Between 1940 and 1947 breeding ewe figures rose from 120,600 to 124,000 and the amount of lime railed into the area was trebled, the quantity for the 12 months ended March 31, 1947, being 12,400 tons.

The use of Certified seeds has played a major part in pasture improvement in the county, the majority of farmers being aware of the advantages of using first-class seed.

Perennial ryegrass forms the basis of the seed mixtures on all types of land, but other constituents vary somewhat. On the soils of groups 8 to 10 subterranean clover is serving a most useful purpose and over the past 12 to 15 years it has been one of the major factors in improving the productivity of these shallow and stony soils. A typical mixture containing subterranean clover is: 20 to 30lb. of perennial ryegrass, 2lb. of red clover, 2lb. of white clover, and 2 to 3lb. of subterranean clover.

Such a mixture usually is sown under a cover crop of rape, kale, or turnips, and after this crop has been fed off the pasture is nursed in the first year to ensure a good seeding of subterranean clover. Though in a dry season subterranean clover does not persist as long as red clover and may cease production 3 to 4 weeks before cowgrass, its total production and its ability to reseed annually make it a most valuable plant to the light-land farmer. Where a good subterranean clover pasture has been maintained for a considerable period fertility may be built up to such an extent that volunteer white clover will appear.

The ability of cocksfoot to withstand grass-grub attacks and to produce fairly late into the summer accounts for its increasing popularity on the shallow and stony soils. A typical mixture including cocksfoot is as follows: 15lb. of perennial ryegrass, 8lb. of cocksfoot, 2lb. of red clover, 2lb of white clover, and 2lb. of subterranean clover.

A mixture of cocksfoot and lucerne may have value on these shallow and stony soils. Sown at the rate of 10lb. of lucerne and 5lb. of cocksfoot per acre, this combination will, if handled well, give a sward that produces a crop of hay and light grazing when ryegrass has ceased producing.

On the land of soil groups 1 to 7 seed mixtures are fairly standardised, the following being typical: 20lb. of perennial ryegrass, 3lb. of white clover, and 2lb. of red clover. This mixture may be sown under a cover crop, frequently rape, or on a summer fallow following greenfeed, which gives the most satisfactory results. Usually 1 ton of lime per acre is sown on the fallow land and 1cwt. of superphosphate per acre with the seed.

To secure a good stooling out of the plants the aim is to graze early and in this respect heavy stocking for short periods gives the best results. Where a ryegrass-white clover mixture has been sown a crop of ryegrass seed may be saved in the first year, the ryegrass being encouraged by lenient grazing in late winter and spring. If in the second or third year white clover is saved, the pasture is heavily grazed in the spring and shut up later when the clover is coming away.

When regrassing is done on the foothill country (soil groups 12 to 14) the mixture usually includes crested dogstail, which is reliable and produces fairly palatable sheep feed. Montgomery red clover is also well suited to this country.

Grass and Clover Seed

Malvern County has always harvested a considerable area of small seeds; as far back as 1921-22 more than 1000 acres were harvested and the figures increased during the slump years 1931-34. Certification of ryegrass, which was started in the 1929-30 season, lent impetus to the saving of seed. The area saved for seed increased again in 1940-41 to more than 3000 acres because of the excellent prices ruling, and in 1946-47 nearly 4600 acres were devoted to the production of grass and clover seed.

Cattle

Apart from the small pocket of meadow soils in the Waireka Valley, the county is quite unsuited to dairying and cattle grazing. In 1946-47 dairy cows in milk numbered 1062, which is an average of less than 3 cows per holding. The number has been as high as 1659—in 1935, when farmers were milking a few extra cows to supply small amounts of cream to factories to supplement the farm revenue.

Some small herds of beef cattle are run in the foothills country, though their numbers are limited mainly because little replacement stock is available.

Sheep

The over-all carrying capacity of the county on a 12-month basis is about 1 sheep per acre. On the more intensively cropped areas sheep are of less importance to the farming economy than cash crops, but on the light land (soil groups 8 to 10) and on the hills (groups 12 to 16) greater emphasis is placed on sheep husbandry. Breeding ewes have shown a steady increase throughout the period 1920-45, except for the slump period 1930-35, when increased areas were devoted to cash cropping. The numbers rose again in 1936 and in 1937 reached their peak at 135,000; they then declined to 111,650 in 1941, but there has been a recovery in recent years, the total in 1946-47 being 124,070.

The proportion of wethers to breeding ewes in the years 1920-26 was relatively high—about 15 per cent.—being a reflection of the fairly widespread use of half-bred and Leicester rams, as a result of which there was a greater carry-over of wether lambs. From 1926 onward Southdown rams rapidly replaced other breeds and, as

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Good shelter from north-west and southerly winds provided by a plantation of larch and wellingtonias. In the foreground is a crop of turnips.

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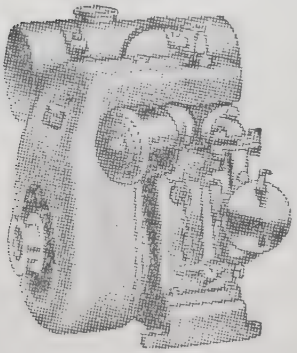

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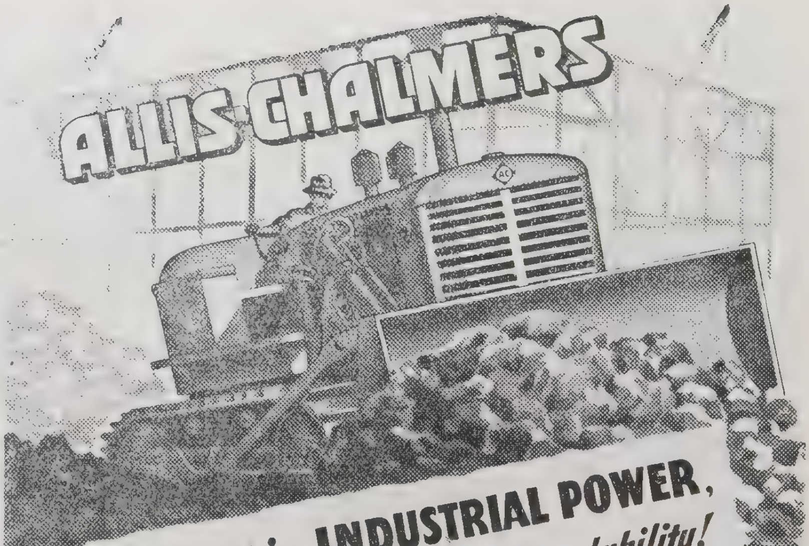

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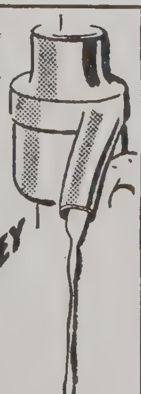

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Half-bred sheep grazing on light stony land in Malvern County. Progress in the county may rest on the building up of these lighter areas and in this respect wider use of subterranean clover would appear to be the first requirement, while irrigation would increase the production of substantial areas.

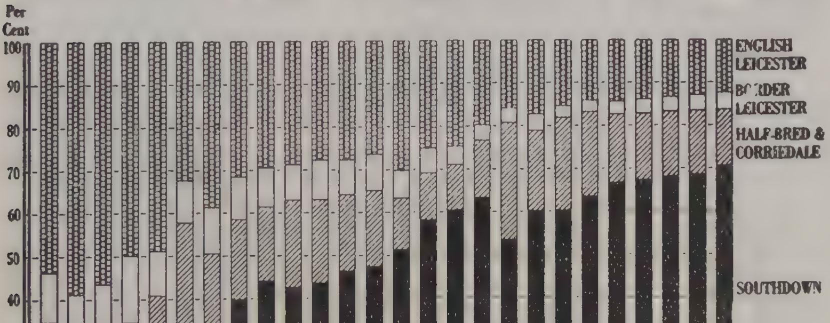
the Down cross lamb fattens sooner and besides is a poor carry-over lamb, the practice of carrying over wether lambs has almost ceased. As much of the county is suited only to half-bred and Corriedale flocks, these breeds of rams have not fluctuated greatly. It is probable though that they will be replaced to some extent in the foothill country by a stronger-woolled sheep, a three-quarter-bred or a Romney, for the latter breeds are more resistant to foot-rot and produce a payable fleece under the colder and wetter conditions of the foothills. Ewe flocks are almost entirely half-breds and Corriedales. Very little breeding of flock replacements is done on the plains, replacements being bought mainly at the autumn ewe fairs or at the Addington market. Two-tooth or full-mouthed ewes from hill- and high-country flocks are purchased. Two ewe fairs are conducted within the county, at Sheffield and Coalgate, and farmers may also choose their stock at the Amberley, Culverden, Oxford, or Little River ewe fairs.

Transport and Markets

The county is well served by rail, no point in it being further than 10 miles from a station. The main west coast line runs through the county, with a branch line from Darfield to Whitecliffs, and the southern districts are served by the main south line, which runs through Burnham and Norwood. The area has a network of good roads, over which several cartage firms operate. Motor transport is increasing in scope, especially with regard to the fat lamb trade.

The Addington saleyards are generally regarded as the hub of the livestock industry of Canterbury. Market fluctuations there can influence farm management in Malvern County considerably and the store lamb position from early March onward is followed closely by farmers who may have a surplus of fattening feed or more lambs than they can finish. In dry seasons the store market will be swamped and prices low; in good seasons demand will exceed supply and prices will be high.

PERCENTAGE INCREASE OF SOUTHDOWN RAMS AND DECREASE IN ENGLISH AND BORDER LEICESTER RAMS



Water

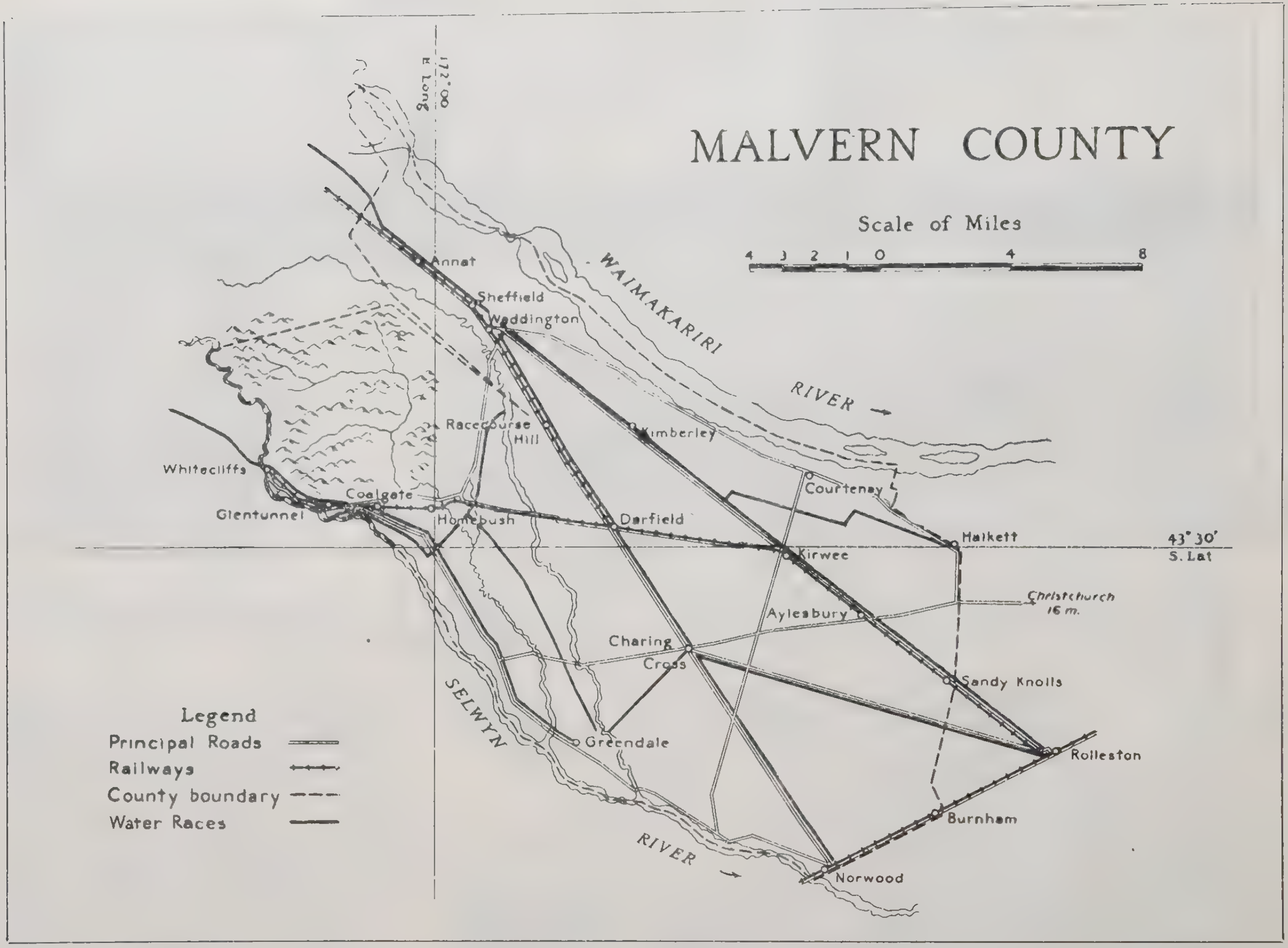
Lack of water has been one of the main factors limiting farming on the Canterbury Plains, though it has been offset to some extent in Malvern County by the construction of an admirable water-race system which serves 116,850 acres and many small households. The scheme is controlled by the Malvern County Council.

The map on page 348 shows the layout of the races and the sources of the water. From the main races a network of subsidiary races reticulates almost every paddock, there being about 300 miles of races. The maintenance and clearing of the races is undertaken by the county council, which levies a rate of £2 per 100 acres. As the agriculture of the county has expanded and further subdivision has taken place the supply of water has become less adequate. In fact a dry season now creates a shortage of water and rationing is necessary.

A scheme for utilising the abundant water of the Waimakariri River has been envisaged, even to the extent of having a survey made, but the possibility of an irrigation scheme from the Rakaia River instead has resulted in no further action being taken at present.

Gorse Hedges

Gorse hedges are a feature of the Canterbury Plains landscape and Malvern County is no exception. These


MALVERN COUNTY
Scale of Miles
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172° 00' E Long
WAIMAKARIRI RIVER
SELWYN RIVER
Annat
Sheffield
Waddington
Racecourse Hill
Kimberley
Courtenay
Whitecliffs
Coalgate
Glentunnel
Homebush
Darfield
Halkett
Kirwee
43° 30' S. Lat
Christchurch 16 m.
Aylesbury
Charing Cross
Sandy Knolls
Greendale
Rolleston
Burnham
Norwood
Legend
Principal Roads
Railways
County boundary
Water Races

[*Map drawn by Department of Lands and Survey, Christchurch.*

hedges were the answer to a fencing problem, there being no timber available in the early days for post and wire construction. The gorse was planted either on a sod wall excavated from a ditch or merely on the angle of a single furrow. For the hedges to remain stock-proof and vigorous it is essential for them to be trimmed regularly and in the past finding sufficient labour for this work was a major problem. However, mechanical cutters mounted on tractors are now widely used.

Farm Management

Farm management varies chiefly according to whether cereal crops for threshing are included in the crop rotations or not, and this is largely a reflection of soil conditions. To some extent other modifying factors play an important part: For example, slope, rainfall, and cultivation problems limit the scope of cropping in the foothills.

Table 2 gives a comparison between all the farms in the county which harvested cereals for threshing in 1945-46 and those farms which did not.

Within the area growing cereals for threshing there is little difference between the carrying capacity of the sown grass areas on farms of various sizes (Table 3).

TABLE 2—CARRYING CAPACITY OF MALVERN COUNTY FARMS, 1945-46

	No. of farms	Total area (acres)			No. of ewes	Ewes per acre of sown grasses	Fodder crops per 100 ewes (acres)
		Sown grasses	Fodder crops	Cash crops			
Farms growing cereals for threshing	193	69,675	13,691	16,557	95,886	1 1/3	14
Farms not growing cereals for threshing	63	15,977	2,350	515	22,591	*1 2/5	10

* There were 13,535 acres classified as being in native grasses and tussock in Malvern County in 1945-46. The greater part of this is included in the farms not growing cereals for threshing and thus the number of ewes per acre of grassland on these farms is approximately 0.76.

TABLE 3—NUMBER OF BREEDING EWES PER ACRE OF SOWN GRASS FOR FARMS PRODUCING CEREALS FOR THRESHING

Size of farm (acres)	Number of holdings	Area in cash crops as percentage of sown grass	Area in fodder crops as percentage of sown grass	Breeding ewes per acre of sown grass
101-150	5	70	50	2.0
151-200	9	49	26	1.3
201-250	13	40	16	1.7
251-300	25	32	21	1.7
301-350	24	23	20	1.6
351-400	13	19	23	1.2
401-450	15	21	22	1.4
451-500	10	25	23	1.3
501-550	18	34	22	1.6
551-600	4	21	19	1.3
601-700	5	23	22	1.5
701-800	14	25	21	1.4
801-900	11	24	25	1.4
901-1000	7	13	12	1.05
Over 1000	20	11	16	1.2

In the study of farm management methods which follows an endeavour has been made to discuss average methods, though to some extent the material is based on the opinions of farmers who have had better-than-average results.

Mixed Arable Farms

Light grazing and cropping land (soil groups 8 and 10): This is a fairly extensive area of land to the north of the Burnham-Norwood road and merging into the light wheat land (soil group 9) in the vicinity of Aylesbury and Charing Cross. The size of the holdings is necessarily large and it appears that 900 acres are required for a paying unit. The products of the area are fine wools, store sheep, and some fat sheep and lambs. In some parts unsuited for breeding ewes only wether flocks are maintained.

A good farm in the area is one of 1600 acres in the Norwood district. It has been developed to its relatively high state of productivity by the use of subterranean clover, the application of lime, the provision of shelter, and the ability of the farmer to modify his farming programme considerably when the necessity arises. This last factor is most important on light land.

Each year about 200 to 250 acres have been ploughed, though bad grass-grub attacks may mean that even more ploughing may be required. The rotations are simple and of short duration, and there is no set plan for each year, acreages in crop being adapted to meet the requirements of the season.

Turnips are the basis of all supplementary feeding, even to the extent of being sown with rape and kale. As turnips are the most reliable crop, the risk of a total failure is minimised.

A typical rotation may be: Old grass, rape and turnips, sow down to pasture under kale; or, where a crop of oats may be taken, old grass, oats, sow down with chou moellier; or old grass, oats, greenfeed, sow down with rape and turnips.

The common seed mixture sown under a cover crop is 30lb. of perennial ryegrass, 2lb. of red clover, 2lb. of white clover, and 2lb. of subterranean clover.

Meadow hay has been harvested in the past, but the quality generally has not been good and an attempt is being made to establish lucerne for this purpose. If harvesting conditions are satisfactory, grass seed will give payable yields in the second or third year.

The farm carries slightly more than 1 ewe per acre. Replacements are bought in as 4- and 5-year olds and mated with Southdown rams bred on the property. Ewes are lambed on autumn-saved pasture or greenfeed in well-sheltered paddocks. The value of good shelter is reflected in the lambing percentage, 105 to 110. A high percentage of lambs goes away fat off the mothers before Christmas, the remainder being fattened on fodder crops. In a good season usually 1500 store lambs and 1000 wethers are bought in for fattening.

It cannot be stressed too strongly that a set programme cannot always be followed, as there are many factors —drought, grass-grub, porina, high winds, and even snow—which may make a quick change in the year's programme necessary.

Light wheat land (soil group 9): As the land gradually develops a subsoil and the degree of stoniness decreases and depth of topsoil increases it becomes possible to grow occasional payable crops of wheat. This light wheat land is bounded in the east by the Hawkins River sedimentary deposits and in the north merges into medium land more or less on a line with the Kirwee-Darfield road. A smaller pocket exists to the south of Homebush, between the Selwyn and the Waireka Rivers. The products of this area are wool, fat stock, some store stock and wheat and oats, and small quantities of small seeds, but the productivity is limited by factors similar to those which affect returns on the shallower and stonier land: Dry seasons make cropping risky and grass-grub and porina attacks on pasture are very costly. Subterranean clover, lime, and shelter are still the important factors in increasing production.

Though larger than average and probably managed with more than average efficiency, a farm which gives a good picture of the way light wheat land is handled is one of 2500 acres near Charing Cross. Of the 2500 acres 300 are in straw crops, 150 in turnips, 180 in kale, 40 in rape, 130 in greenfeed, and 1600 in grass. Each year 400 acres of old grass are ploughed up. The usual rotation is: Old grass, greenfeed, turnips, rape, sow down to pasture under kale; or, when wheat is included, old grass, rape, wheat, sow down. The grass seed mixture used with kale is 10lb. of perennial ryegrass, 5 to 6lb. of red clover, and 2lb. of subterranean clover.

The farm carries 2200 ewes and replacements are bred on the property. All the ewes are mated to Corriedale rams and 500 ewe lambs are retained

[Green and Hahn Ltd. photo.

A view of the downs, looking toward the Waimakariri River.

and reared on the farm. The lambing percentage is usually 100, which is good, considering that there are 500 2-tooths each year. Fifteen per cent. of the lambs go away fat off the mothers and the remainder are fattened on supplementary feed. There are no carry-over lambs and no lambs are sold as stores. Cast ewes are fattened for the works.

Lucerne hay from a 30-acre stand supplements the winter turnips.

Medium wheat land (soil group 7): This type comprises land in the Annat-Waddington-Kimberley area mainly and merges into the light wheat land near Darfield and Kirwee. The products are cash crops (wheat, oats and some peas, barley, and potatoes), small seeds, fat lambs, fat sheep, and half-bred wool. Rotations are widely diversified, as the land is capable of growing a variety of crops.

A well-balanced farm in this group is one of 700 acres in the Kimberley district close to the banks of the Waimakariri River. Generally the cover would be: 350 acres of grass, 200 acres of straw crops, and 100 acres of green and root crops. A normal rotation would be: Old grass, wheat, rape or turnips, oats, rape or turnips, grass down. To maintain this rotation 100 acres of old grass have to be ploughed up each year, which means that pastures stay down about 7 years.

The following pasture mixture is customarily sown under rape or turnips: 20lb. of perennial ryegrass, 3lb. of white clover, and 2lb. of red clover. A crop of ryegrass seed may be taken in the first year and perhaps a crop of white clover seed or a cut of hay (which on the average would yield 1½ tons per acre) in the second season. Usually 1 ton of lime per acre is sown on the ploughed land and 1cwt of superphosphate is drilled with the seed.

The farm carries 700 breeding ewes, which are mated with Southdown rams. Replacements are bought in, half-bred ewes being obtained each year from the same high-country station. Forty to 50 per cent. of the lambs go away fat (36 to 38lb.) off the mothers, the remainder being fattened on supplementary feed. Cast ewes are fattened and sent away in the autumn.

For winter feed turnips are supplemented with hay. Lucerne is a good proposition on this country.

Medium to heavy wheat land (soil groups 1, 2, 4, 5, 6, and 6a): Under this heading are included the Greendale, Gorge Hill, and Halkett-Courtenay districts. A typical farm in the Greendale district is one of 311 acres on the west bank of the Hawkins River which annually grows about 60 acres of cereal crops, 50 acres of greenfeed, 10 acres of turnips, and 15 to 20 acres of rape. It is considered that a grain crop could be taken every 3 years if the land were suitably treated between crops. The usual rotation is: Old grass, rape, greenfeed, turnips, wheat, sow down to pasture under wheat.

Competition from fat-hen restricts the growing of spring-sown crops such as peas and barley.

The sowing down of pastures under wheat has given quite satisfactory results, though the more general practice in the district is to sow on a summer fallow. Half a ton of lime per acre is sown before sowing the pasture mixture and 1cwt. of superphosphate is drilled with the seed. No small seeds are saved apart from those required for the farm.

Five hundred half-bred ewes are carried, replacements being bought in as hoggets or young ewes. These are mated with Southdown rams mainly, while the finer-woolled ewes are put to Border Leicester rams. In years when feed is plentiful the Border cross lambs do better than the Down cross lambs. More than a third of the lambs go away fat off the mothers and usually 500 to 600 lambs are bought in and fattened.

The important feature of this farm is the emphasis placed on greenfeed in the stock-feeding programme. Half the greenfeed area is sown in Dun oats, at the rate of 50lb. per acre, and half in Italian ryegrass, at 25lb. per acre. By drilling before the end of February some feed is obtained before winter and it may even be used for finishing the lambs remaining after the main drafts have been sold. It is grazed periodically through winter and the ewes are lambed on it. It is possible to feed the Dun oats until November and then obtain a payable crop of grain or chaff. The turnips are supplemented with lucerne hay, three cuts per year being obtained from a good 10-acre stand.

Intensive Grazing Land (Soil Group 11)

There is very little commercial dairying in Malvern County, but on a small pocket of meadow soil in the Waireka Valley about 150 cows are milked for cream supply to a Christchurch dairy factory. Some farmers believe that dairying in the valley could be expanded greatly if some drainage problems were overcome and the present methods of farming in the bottom end of the valley were changed. The dairy farms in the Waireka Valley usually include some hill country on which sheep are run.

A typical farm is one of 578 acres, 50 acres of which are in the valley floor. The soils on the flat are peaty, overlying shingle, which occurs at a depth of about 3ft. The Waireka stream has cut down to the shingle, providing an excellent natural drainage. The flat is never wet in summer and only odd places hold water in winter.

Thirty cows—Jersey-Shorthorn cross cows are favoured—are milked and replacements are bred on the farm. The season (about 8 months) is not a long one, the limiting factor being the relatively long, cold winter. Average production per cow is 240lb. of fat, which is quite good, considering that apart from a small amount of autumn grazing on 25 acres of the hill the cows are restricted to grazing on the flat during the milking season.

About 10 acres of hay are made each year from Italian ryegrass and oats.

The farm carries 3 or 4 Tamworth-Berkshire cross sows, which are mated with a Large White boar for the production of weaners.

A flock of 330 half-bred breeding ewes is maintained by retaining 80 to 90 ewe lambs each year. Lambs are sold as stores on the property about the end of February.

The flats respond to heavy dressings of lime, and superphosphate, applied at the rate of 2cwt. per acre, gives a good response.

Semi-intensive Sheep Farming (Soil Groups 12 to 14)

The lower foothills extend from Russells Flat and behind Sheffield to Homebush, Coalgate, and Glentunnel. The products of this area are wool and fat stock and some store and breeding stock. Some grain is grown on the easier country. Generally the country runs over a ewe to the acre. If treated well, it will hold a fair sward of English grasses and there is marked response to liming and topdressing.

In this district there is a definite swing from half-breds and Corriedales to Romneys. For example, on one farm of 1500 acres of fairly easy foothill country which runs 2000 ewes the flock is almost entirely Romney, having been bred in this direction since 1932. In that year Romney rams obtained from Southland were mated with half-bred ewes; three-quarter-bred ewe lambs were retained for breeding, and the process of selection continued.

Southdown rams are mated with ewes culled from the main flock on the basis of fleece and carcass conformation.

Occasional crops of oats are taken. These are stacked and held as a reserve of feed for years when conditions are severe.

Extensive Sheep Farming (Soil Groups 15 and 16)

Beyond the foothills bordering the plain the country is poor and, though some of the northern faces hold good tussock, a considerable part of the area is covered with gorse, scrub, and broom. The holdings, which are of 1000 to 4000 acres, carry about half a ewe to the acre. Here, too, there has been a swing in favour of stronger-woolled sheep. The products of the area may include a few lightweight, second-grade freezing lambs, but the land is devoted mainly to the production of half-bred and three-quarter-bred wool, store stock, and some breeding stock.

Turnips and swedes are grown for winter feed and some hay may be bought in.

Future Development

Malvern County has many features or problems common to the Canterbury Plains. The better parts are well farmed and present a neat and prosperous appearance. Progress in the county may rest on the building up of the lighter areas and in this respect wider use of subterranean clover would appear to be the first requirement, while irrigation would increase the production of substantial areas.

Acknowledgments

The author wishes to acknowledge the assistance given by the Soil Bureau, Department of Scientific and Industrial Research, in supplying details relating to soils.

Use of Honey Dew for Feeding Bees in Canterbury

SINCE the earliest days of commercial beekeeping in Canterbury honey dew in combination with honey has been produced in apiaries adjacent to the bush-clad mountains in the north-west portion of the province. Now many commercial producers on the plains areas consider the gathering of honey dew essential for bee-feeding, and for this purpose many apiaries have been located permanently in these bush districts. The collection and use of this material are described by E. Smellie, formerly Apiary Instructor, Department of Agriculture, Christchurch.

THOUGH this honey dew is gathered freely by honey bees and is suitable for bee feeding during the breeding season, it is not nectar from floral sources normally gathered and stored by the bees and would not measure up to the standard required for honey sold by commercial beekeepers for table use.

In the north-western portion of Canterbury the vegetation on the lower foothills and mountains is predominantly black beech forests. The trees are of medium size with an average height of about 40ft., and occasional trees are as high as 70ft. with trunks varying in diameter between 2 and 4ft. In the South Island this species of black beech (*Nothofagus solandri*) is confined to the low-rainfall areas on the eastern slopes of the main ranges and extends at intervals from northern Marlborough and adjacent parts of Nelson to as far south as Mount Somers in Ashburton County.

Product of Aphides

The honey dew gathered by bees in Canterbury is produced by a type of aphis propagated on the limbs and trunks of the black beech trees. The aphides belong to the order *Hemiptera* and are plant-sucking insects about ¼in. long. They are particularly parasitic to black beeches and, though they infest these trees in millions, they are rarely visible on the outside surface of the bark. However, as their thread-like tails protrude beyond the bark, their presence can be detected readily and they can be exposed completely by careful probing.

[*Green and Hahn Ltd. photos.*

Upper—Black beech forest on the lower foothills in the Ashley district of Canterbury. Lower—The type of black beech tree which grows at the outer edge of the main forest.

These aphides continuously void unused sap juice, which flows to the extremities of the tail threads, where it accumulates in tiny, clear globules of sweet, viscous liquid. These globules are added to continuously and increase in size until they fall from the threads to the bark, solidify, and turn into black smuts. With successive layering this dried material gradually forms a thick, sooty covering over the surface of the tree—hence the name black beech.

The density of the aphides is governed largely by the climatic conditions. In dry seasons they appear to propagate excessively, but severe weather causes them to be destroyed in great numbers, thus determining whether the season is good or bad for honey dew.

Not Always Gathered

Though the globules of honey dew are always apparent on the trees, especially during late summer and autumn, the bees frequently make no effort to gather from them for two reasons: First, they prefer to work on floral nectars when they are available, and, secondly, as the globules of honey dew are more liquid in the mornings than later in the day, the bees gather from them mainly in the mornings. This irregularity in consistency is caused by the globules softening with their absorption of moisture from the night air and later being dried by the sun. When they have been dried the globules are much too glutinous for the bees to deal with, but if gathering is possible, this substance is carried to the hives, where it is ripened and sealed, making what is known as honey dew. Conditions during February and March appear to be the most suitable, as the bees gather and store the largest amounts of honey dew during this period.

Honey dew from the black beech areas does not granulate, but in other respects it has characteristics similar to those of the usual honeys gathered from floral nectar sources. It contains less of the invert sugars and slightly more of the sucrose sugar than ordinary honey. The chief chemical difference in composition is in the much higher percentage of dextrin or gums. Though honey dew is amber coloured, it is suitable only for bee-feeding or manufacturing.

Disadvantages as Winter Feed

Pure honey dew alone is sometimes used in Canterbury apiaries for winter stores with no apparent detriment to the bees when they are able to take regular cleansing flight, but nevertheless it is of doubtful value as a winter feeding medium because the relatively-large amount of gums which it contains cannot be digested or completely assimilated by bees and causes their faeces to accumulate very rapidly. If the bees are able to fly at frequent intervals, this factor may be harmless, but in districts where low temperatures cause long periods of confinement it may either reduce the vigour of the bees or result in severe dysentery.

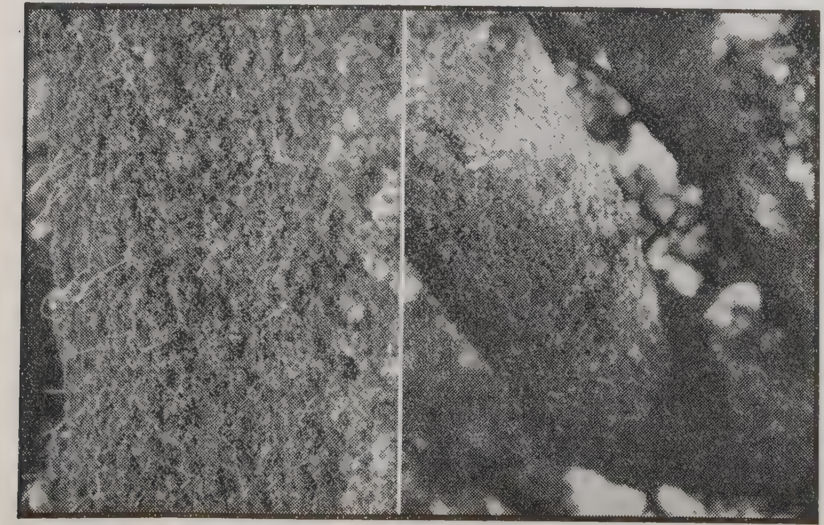
The rapid accumulation of faeces in this way also causes the bees to become unduly active, and therefore the temperature of the cluster is increased. Occasionally the cluster temperature reaches a point at which brood-rearing is begun, and then the increased activity causes further excessive feeding, which also results in the accumulation of faeces.

For these reasons honey dew is more suitable as a food for bees in spring, and it is used mainly for this purpose in some Canterbury apiaries.

Precautions against Disease

Though American foul brood disease does not present the same problem that it did in the past years, these bush districts are uncertain in this respect. For this reason special precautions have to be taken before honey dew can be distributed safely to other colonies. These involve numbering hives and supers, inspecting the brood in autumn before the removal of surplus honey dew, and the correct storage of the numbered supers pending a spring inspection of the apiary. In the event of foul brood being found at the spring inspection, the numbers of infected hives must be noted and each super in the store with a corresponding number immediately withdrawn and treated as diseased material.

At this stage the honey dew in the remaining supers is distributed to out-apiaries and fed to colonies that are low in stores.



[Green and Hahn Ltd. photos.

Portions of the lower bole and upper branches of a tree, showing the tail threads of aphides with adhering globules of honey dew, and the thick accumulations of black smut which have developed from the coagulation of these excretions.

SHOW DATES

THE following are dates and venues of A. and P. shows up to the end of January.

November 3—Ashburton A. and P. at Ashburton.

November 3, 4, and 5—Manawatu and West Coast A. and P. (Royal show) at Palmerston North.

November 5—Amberley A. and P. at Amberley.

November 10 and 11—Canterbury A. and P. at Christchurch.

November 11 and 12—Wanganui A. and P. at Wanganui.

November 12—Waihi A. and P. at Waihi.

November 16—North Otago A. and P. at Oamaru.

November 16 and 17—Marlborough A. and P. (South Island Championship show) at Blenheim.

November 18 and 19—Egmont A. and P. at Hawera.

November 19—Bay of Islands P. and I. at Waimate North.

November 19—Waimate A. and P. at Waimate.

November 22 and 23—Thames Valley A. P. and H. at Te Aroha.

November 25 and 26—Nelson A. and P. at Nelson.

November 25 and 26—Stratford A. and P. at Stratford.

November 26—Banks Peninsula A. and P. at Little River.

November 26—Kaikohe A. P. and H. (horse show) at Kaikohe.

November 26—South Otago A. and P. at Balclutha.

November 29 and 30—Otago A. and P. at Dunedin.

December 3—Winton A. and P. at Winton.

December 3—Tokomairiro A. and P. at Milton.

December 6 and 7—Gore A. and P. at Gore.

December 10—Motueka A. and P. at Motueka.

December 10—Wyndham A. and P. at Wyndham.

December 13 and 14—Southland A. and P. at Invercargill.

December 17—Otago Peninsula A. and P. at Portobello.

January 21—Tauranga A. and P. at Tauranga.

January 21—Marton District A. and P. at Marton.

January 21—Waiau A. and P. at Tuatapere.

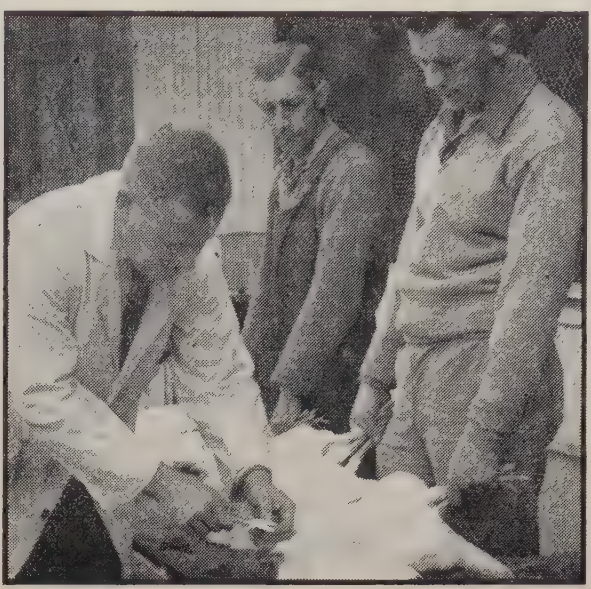
January 27 and 28—Taumarunui and District A. and P. at Taumarunui.

January 28—Helensville A. and P. at Helensville.

January 31 and February 1—Feilding I. A. and P. at Feilding.

Scheme for the Elimination of Pullorum Disease from Poultry Flocks

ELIMINATION of pullorum disease from the poultry flocks of New Zealand is the aim of a voluntary scheme under which owners will test their own birds. The scheme, which will enable poultry farmers whose flocks then pass an official test to have them certified as pullorum free, is detailed in this article by F. C. Bobby, Superintendent of the Poultry Industry, and A. C. Howse, Poultry Veterinary Officer, both of the Department of Agriculture, Wellington.



Blood samples being taken for an official pullorum test.

PULLORUM disease no longer causes such heavy losses in New Zealand poultry flocks as it did before blood testing was established 6 years ago. At one time losses of more than half in young chickens were frequently caused by the disease, particularly in the more susceptible heavy breeds. Such heavy death-rates are now comparatively rare, but losses continue to occur from time to time. Though the percentage of reactors in blood-tested flocks has been reduced substantially, sudden increases in the number of reactors, sometimes accompanied by losses among chicks, may always occur because the disease is infectious, adult "carriers" being likely to spread the germs through the droppings.

Therefore, the Department of Agriculture has decided to introduce a voluntary scheme for the elimination of pullorum disease open to all owners of breeding flocks. Schemes of this nature are already operating successfully overseas, and it has been demonstrated both in New Zealand and elsewhere that flocks can be freed from pullorum by frequent testing of all adult stock, followed by immediate removal of reactors and, what is equally important, disinfection of the houses they have occupied. Under these schemes all birds which pass the test are put into clean houses at once.

The degree of infection by pullorum disease in New Zealand has been reduced substantially by testing annually many breeding flocks throughout the country, and it is now considered that an attempt should be made to eliminate this disease in as many flocks as possible. Consequently, the following scheme is recommended to all poultry breeders for their careful consideration.

Testing by Owners

Poultry producers are now able to buy pullorum antigen for blood testing from the Department of Agriculture and to test their own flocks if they so desire. By purchasing antigen and testing their own birds poultry producers are able to carry out this operation at times suitable to themselves and over a period, thereby lessening the heavy pressure of work occasioned when this testing has to be done in a short period during the visit of an officer of the Department.

Owners who wish to eradicate pullorum are advised to test their flocks themselves as often as possible subject to a minimum interval of 30 days between tests of any one group of birds. This testing should be continued until the entire flock has passed a test without any reactors being revealed. Not only the breeding stock but all birds over 6 months of age should be tested in this manner.

Official Tests

When a flock has been shown to be clear of reactors the owner should apply to the Department for an official test of the entire flock to take place after an interval not shorter than 30 days from the last test performed by the owner. If this official test, performed by an officer of the Department, discloses no reactors, a certificate to the effect that the flock is pullorum free will be issued by the Department. Such a certificate will be valid for 12 months and will be renewed at the end of that period if no reactors are found when an official annual renewal test is made. However, should this renewal test reveal the presence of reactors, it will then be incumbent on the owner to carry out testing on his own behalf until the flock is again free of the disease. Then another official test will be made and, if no reactors are found, the certificate will be re-issued or renewed.

Owners whose flocks qualify under the scheme will be entitled to apply to them the designation "certified pullorum free" and to advertise them as such. If such a breeding flock is already accredited under the New Zealand Poultry Flock Improvement Plan, the fact that this flock is also certified pullorum free will be noted in all publications associated with the plan. In addition, the Department of Agriculture will publish from time to time a list of flocks which have been certified as pullorum free.

Though the elimination of pullorum disease from a flock by this method may entail careful and consistent blood testing over a period in the first instance, blood-testing work will be much reduced once a pullorum-free flock has been established. The advantages of a pullorum-free flock to the owner are obvious, and buyers of hatching eggs and day-old chicks will be able to obtain their requirements with added confidence from owners of pullorum-free flocks.

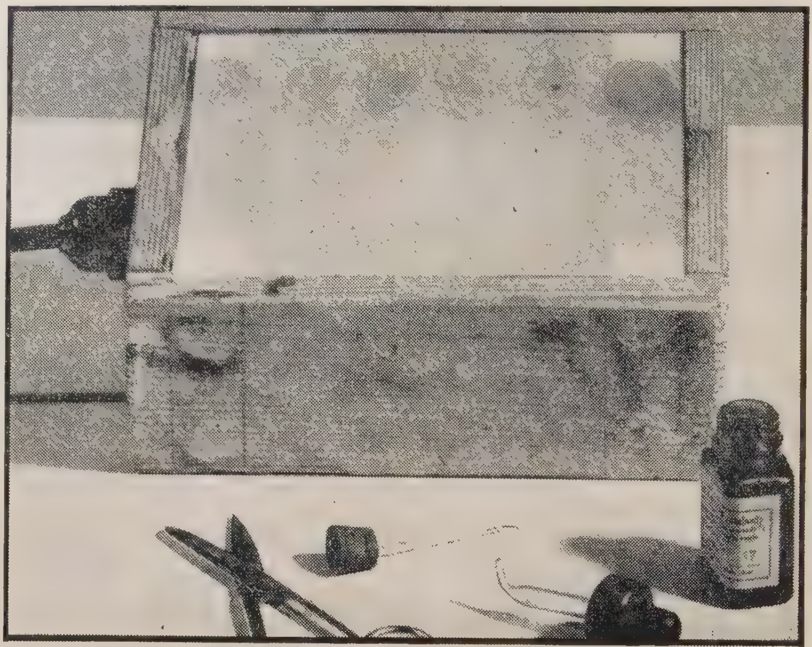
Advice and Assistance Available

Full details of this scheme have not yet been decided, but all interested poultry producers should either write to the Poultry Veterinary Officer, Department of Agriculture, P.O. Box 3004, Wellington, or discuss the subject with their local Poultry Instructor. Advice and assistance will be given to all producers who wish to undertake an intensive programme of testing with a view to obtaining a pullorum-free certificate, and close consideration will be given to carrying out the final official test at a time convenient to the flock owner.

Owners who intend to take advantage of this scheme and who ultimately obtain a pullorum-free certificate for their flocks must bear in mind that the utmost care will have to be exercised with the introduction of new stock to a farm from which pullorum disease has been eliminated. Once a flock is free of pullorum, this disease is likely to be reintroduced only by the bringing in of infected eggs, chicks, or adult stock. Furthermore, as some misunderstandings have already occurred, it is necessary to stress that testing for pullorum disease does not give protection against other poultry diseases which occur in New Zealand.

Electric Testing Box for Making Pullorum Blood Test

IN view of the introduction of a scheme (described on the previous page) for the blood testing of their own flocks by poultry farmers with the aim of eliminating pullorum disease, a device to replace the cumbersome hot-water tank which is standard equipment for the test at present should interest poultry keepers who are in a position to use it. It was made according to suggestions by Mr. E. C. Chambers, manager of a Christchurch poultry farm, and is described by S. G. Haddon, Poultry Instructor, Department of Agriculture, Auckland.



THIS electric testing box can, of course, be used only where power is available or can be made available near where the testing is normally carried out. On the farm where it was devised 50yds. of flex and two power points service all the laying houses.

The frame is made of 4in. x 1in. pine dressed down to 3½in. x ½in. The side and end pieces are nailed to four short pieces of wood. The tops of these corner pieces are 1/16in. below the level of the sides, and their bottom ends project ⅛in. below the sides of the frame. The frame was made of a size to suit a photographic half plate. The depth was largely guess-work, but the result was entirely satisfactory; 3½in. should be regarded as the minimum and 4in. as the maximum depth.

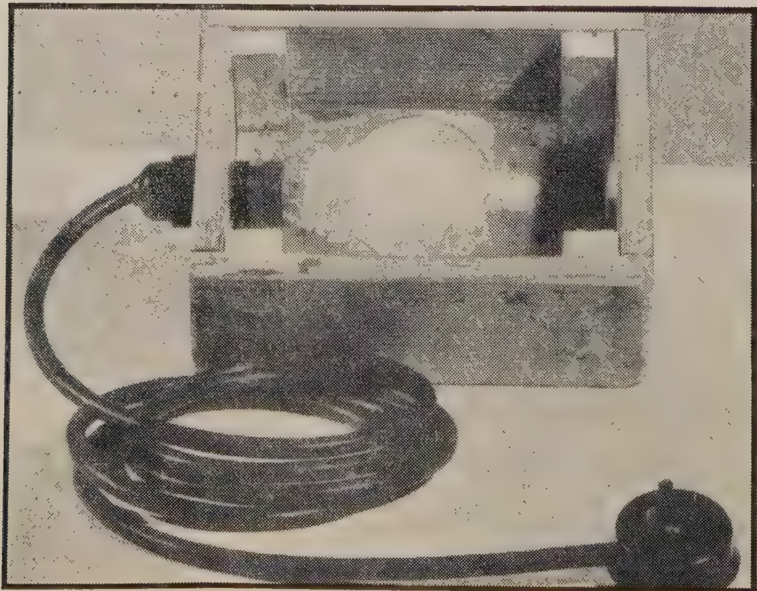
An ordinary plastic lamp socket was inserted in the centre of one end and the heavy flex wired to it. A curved tin reflector was mounted on a strip of wood fixed lengthwise across the bottom of the box. As a further refinement, a switch could be mounted on one of the sides, but it is doubtful if it is necessary.

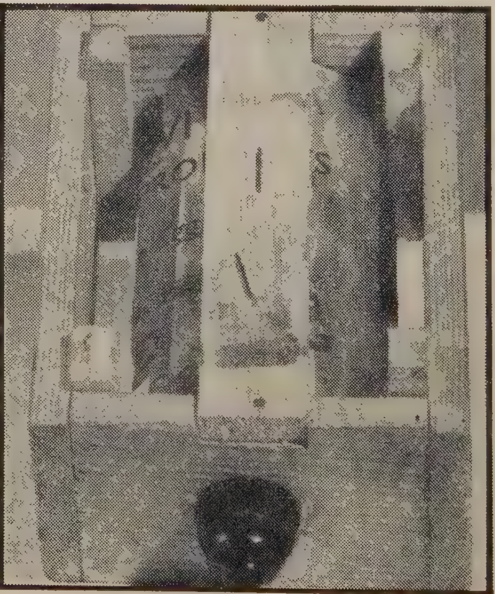
The top of the frame holds a half-plate ground-glass screen (obtainable from most photographic supply houses), rough side downward, and on it is placed the slide on which the blood test is carried out. Quarter plates or microscope slides can be used if preferred.

For outdoor operation a 60-watt pearl lamp underneath the ground-glass screen is needed for warmth and light, but for indoor use in wet weather, or in protected localities, a 40-watt pearl lamp provides ample heat and light and makes the reading of the test accurate and easy and independent of natural light. In hot weather a 25-watt pearl lamp probably would give all the warmth necessary for accuracy.

This testing box cannot be used on many farms, but where power is available, or can be made available at a reasonable cost, no farmer will be content with the hot-water oven after experiencing the ease of working with the electric frame.

[All photographs by Green and Hahn Ltd.





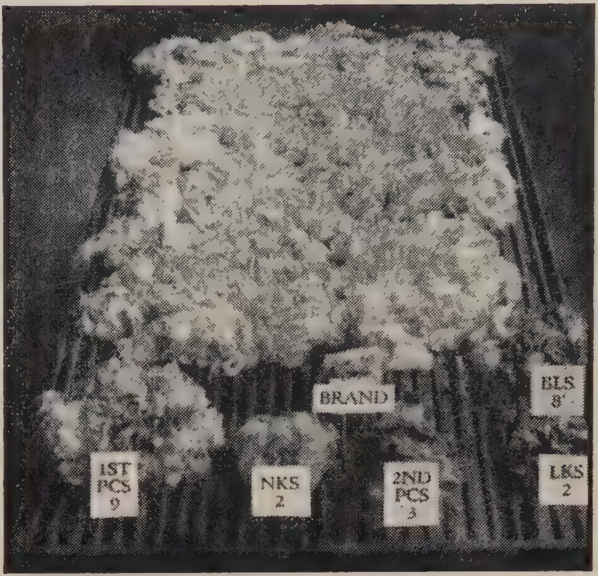
Care of Oddments in the Grower's Woolshed

A BASIC factor which influences the correct grading and eventual maximum bidding on a clip of good wool is the care and treatment which the wool receives in the woolshed at shearing. Rough or inefficient shed work, faulty skirting, and the mixing of oddments cannot be corrected fully after the wool has been rolled and pressed even by expert staff employed by brokers. In this article R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings, describes shed routine which will assist brokers to get the best returns possible.

THE importance of the wool clip to New Zealand and the problem of obtaining sufficient skilled labour in woolsheds at shearing time make it absolutely necessary that each wool grower at least should understand the fundamentals of preparing his wool clip and be able to instruct his woolshed staff on the manner in which fleece wools and oddments should be prepared. Irrespective of where the wool is classed, a good clip must be efficiently skirted and odd lots correctly separated in the woolshed at shearing time if a broker is to present it to best advantage to draw that very important extra bid at the wool sale. Unfortunately the oddments (necks, pieces, bellies, etc.), which constitute about one third of the wool clip and therefore a considerable portion of the wool cheque, are often considered "just oddments" and fail to receive the consideration and attention they warrant.

Many growers of good-type wool have neither the time nor the opportunity to make a detailed study of the trade grades, speciality lines, and workmanship required to obtain the maximum return from the current season's market, but where a fully-competent classer is not employed the broker will attend to those matters efficiently in his "bin" or reclass if the wool has been correctly treated in the shearing shed. Fleece wools generally receive more attention in the grower's shed than do the oddments and it is particularly with these oddments that many growers can assist their brokers to secure better returns.

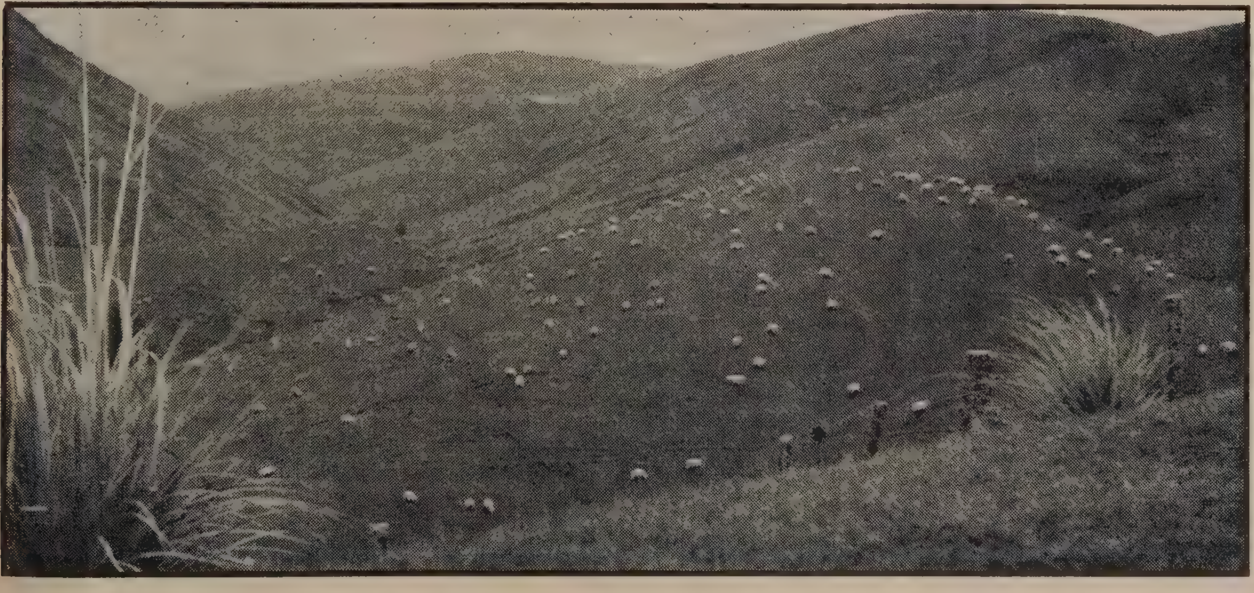
Lack of knowledge of elementary grading and trade requirements usually forces the farmer to leave the preparation of 12 months' conscientious work to casual hands who may or may not be conversant with the buyers' and brokers' requirements.



A typical North Island crossbred fleece, showing the approximate percentage of oddments which should be removed: First pieces (1ST PCS), 9 per cent. of the fleece weight; necks (NKS), 2 per cent.; second pieces (2ND PCS), 3 per cent; bellies (BLS), 8 per cent.; locks (LKS), 2 per cent.

Grower's Responsibility

Where a competent classer or wool hand is not employed the grower must be capable of supervising the work done in his shed and he must have the knowledge and ability to demonstrate what workmanship is required; how, otherwise, can he be capable either of criticising or appreciating the work of his employees? In his own interest a grower must accept responsibility for the standard



The shearing muster should be made over clean country wherever possible.

CARE OF WOOL ODDMENTS

Left—Dagging a sheep which is sitting in a dusty yard. Right—Showing the discoloration by dust and dirt which results.

of his shed work and it is becoming essential that the owner should be in his shed throughout shearing. The grower's presence and constant inspection of the bins has a good psychological effect on his staff, and should the grower be doubtful of his ability to criticise, inspection alone serves as an effective check.

Many farmers believe that shed work is not important when a clip is forwarded for reclass or bin; that misapprehension is responsible for considerable loss of revenue, irrespective of unnecessary labour charges, which directly or indirectly must eventually be borne by the grower. When a clip is baled and pressed in the grower's shed it bears the hall-mark of that shed's workmanship. Rough work, faulty skirting, and mixing of pieces cannot be compensated for fully by later expert attention in brokers' reclass or bin. Time and labour are often too valuable to waste in attempting unchargeable re-skirting or hand picking of oddments—work which would have been comparatively simple in the shearing shed and could have been done more efficiently there.

Mustering

Preparation of the clip really begins when rams are mated with ewes, but for the purpose of this article it begins with the muster before shearing. The shearing muster should be made over the cleanest routes, avoiding, wherever possible, contamination from sources such as dirty country, seed, heavy thistle, burr, burns, blowing sand, and road droving.

The dust menace associated with mustering, road droving, and yarding is seldom fully appreciated by woolgrowers. Many growers who consider their wool to be of good colour would be astounded if they could compare their clip with a really bright line.

Often farmers inspect their wool in their own sheds only—they do not compare it with other lines—and under these circumstances are often unaware of the full detrimental effect of dust because usually the whole clip is affected similarly by it. The harmful nature of vegetable matter, burrs, seed, sand, thistles, etc., is often recognised, but the extent to which dust can affect appearance, yield, and grading is not so commonly appreciated. Last season one good clip was depreciated by about 3d. a pound through dust alone, dust being the factor which made the difference of a grade type.

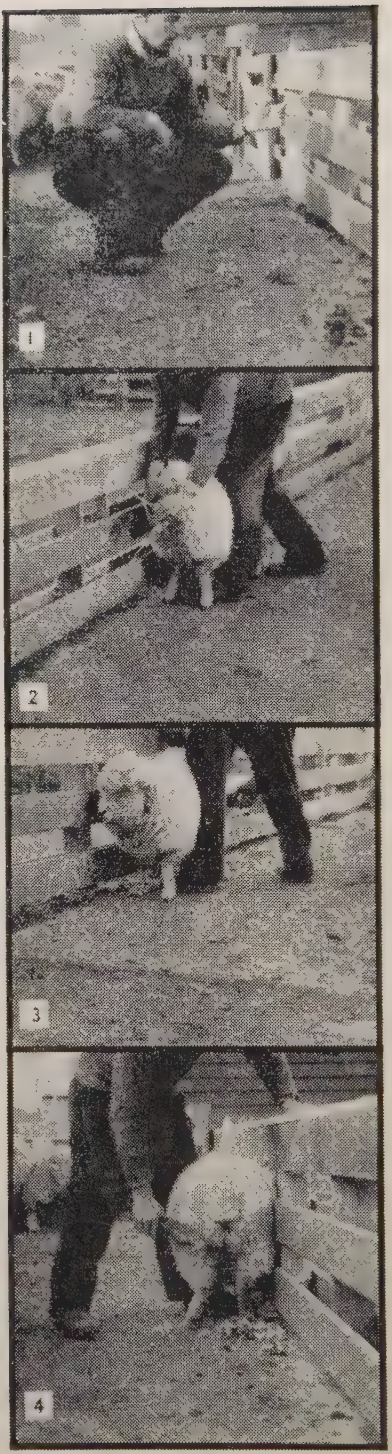
Clean Sheep Yards

Clean sheep yards are important and where dust is inclined to be troublesome a hose or a sprinkler system can be used to advantage. To obtain clean yards it is very necessary to clear away or sweep up loose rubbish, free dirt, leaves, and sheep droppings before dampening the yard. Crushed wet droppings, or crushed dry droppings and a good breeze, will soon discolour a whole yard of sheep.

Dagging

Dagging must be thorough if clean, bright wool is to pass over the wool table. With large flocks the sheep to be dagged can be drafted off and the dagging done efficiently on the shearing board in a manner similar to fly crutching. This method has the advantage that it can be done under clean conditions and there is no wastage. With smaller flocks odd dirty sheep can be done in a clean pen or yard, but cleanliness is essential for clean, bright, fleece wool; if sheep are turned over in a dirty yard, they pick up unnecessary dirt and dust. Where a few sheep require dagging before entering the shed some farmers may prefer to dag them standing and so avoid sitting the full-woolled sheep in dust or dirt.

To assist in the dagging of standing sheep an arrangement of light rope loops can be employed. These loops are fitted at intervals along the sides of the crush pen. Two holes are bored, one above the other, in the side of the crush and a light rope, knotted at one end, passed through the bottom hole, up the inside of the crush wall, and out through the top hole, where it is passed through a loose wooden block (or other slightly-weighted object) and again knotted. The loose wooden block holds the rope taut against the side of the crush when the rope is not in use, but when a sheep is to be dagged the loop is pulled out and the animal's head pushed through. With the sheep held against the side of the crush and being pushed forward into the rope collar it can be dagged speedily and efficiently while standing. This method



Where pre-shearing dagging of odd sheep is necessary an arrangement of rope loops fitted to the sides of crush or pen makes it possible to dag sheep without sitting them in dust and dirt. 1—Rope fitted to side of crush. 2—Sheep turned into loop. 3—Dagging standing sheep. 4—Sheep easily and efficiently dagged; note the clean, unstained wool.

Pre-shearing drafting assists in improving the efficiency of shed work.

saves considerable physical exertion and makes it unnecessary to turn big sheep over, and at no time is the wool in contact with dirty or dusty flooring or yard.

After dagging sheep should not be penned too tightly in the woolshed; the catching pen should never be filled over-night. Cleanliness in the catching pen is important, as it is almost impossible to keep a shearing board clean if the catching pen becomes fouled.

Drafting

Drafting is another important factor in shed-labour economy. Wet ewes, dry ewes, wethers, hoggets shorn as lambs, long-woolled hoggets, lambs, and rams should all be drafted and shorn separately. Generally, pieces, bellies, and necks from hoggets are much finer in quality than similar wool from older sheep and warrant separation. A few wethers shorn with ewes can depreciate a whole bale or line of bellies unless the urine stains have been removed from the wether bellies and that is seldom done where sexes are shorn mixed. If mixed sexes and ages go over the board together, more facilities and much more space are required than the average woolshed can provide. Apart from this, it is almost impossible at this busy time for even an experienced classer to give mixed lots the attention they warrant.

Cleanliness in Woolshed

The need for cleanliness in the woolshed cannot be over-emphasised. Dirty or untidy conditions usually lead to untidy, slovenly workmanship. Conversely, clean, bright conditions generally lead to better workmanship and a much greater interest in the work. The woolshed floor should be scrupulously clean before and during shearing and the board and wool table should be scrubbed well. In some districts it is customary for the board and table to be scrubbed after shearing, but though this is a good practice, it must be emphasised that scrubbing them before shearing is more important. Other major points in shed cleanliness are: Starting of all the machines in the shearing shed before shearing and before the final clean-up, to dislodge accumulated dust; sheep-high spraying of shed interior with a good disinfectant; and the cleaning of hand pieces and sterilisation of all combs and cutters.

Skirting

There are many rules for skirting, but some of them when applied to the wrong types of wool give indifferent results. Skirting rules must be applied with common sense, and a good all-purpose rule is to take off as little as possible to leave a clean, uniform fleece. Experienced table hands know when and where to skirt and what to do with the pieces, but where "green" hands are employed it is safer to instruct them to leave odd burry, dirty, black, or cotted fleeces unskirted and place them in a separate lot. Such fleeces if skirted may affect seriously good piece lines, as burr, seed, or cotted points may get into the better-piece bins. A little burr in otherwise free pieces can depreciate the whole line to a burr grade and thus deter a buyer seeking free lines from competing for that line. Some farmers fail to appreciate the value of good skirting, but a point often overlooked is that, though low-grade, off-colour wools may not warrant more than limited skirting, the importance of good skirting increases proportionately with quality in better-type wools.

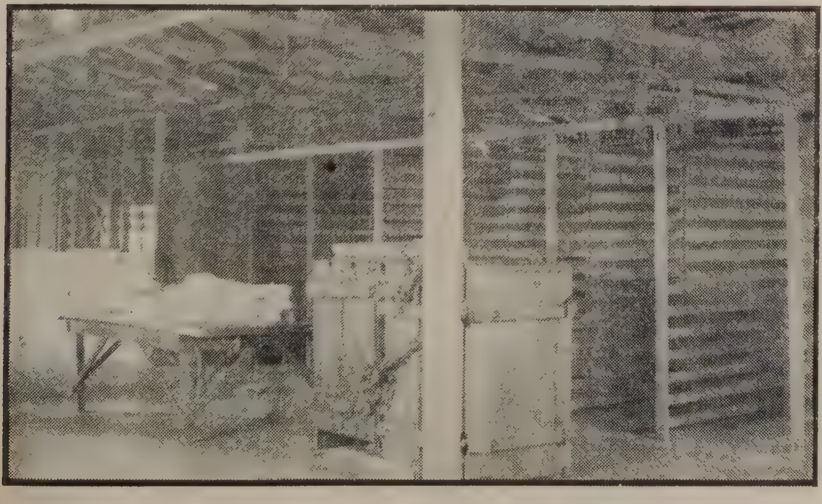
Should market rates revert to J.O. floor prices, the difference between skirted and unskirted lines will be much more apparent. Poorly-skirted or unskirted lots will be the first to feel the repercussions of a buyers' market.

Pieces

Brokers and growers do not necessarily mean the same thing when they use the terms first and second pieces, lambs, etc., and it may save confusion if growers adopt the terms A and B for oddment lines.

A pieces need not be big pieces and should not be confused with "broken fleece." Heavy-handed skirters should be checked, because as much good clean wool as possible should be left on the fleece, providing it is of the same general quality as that of the fleece. A common form of bad skirting is the removal of good-sized pieces from some parts of the fleece while leaving small, heavy-conditioned pieces and stains on other parts. A wool table that is too small is frequently another cause of faulty skirting and big pieces. A good wool table should be accessible from all sides and should be 9ft. x 4ft. 6in. and 3ft. high. Where smaller tables are used large fleeces will overlap and, if the wool tends to be of an open type, big sections may fall off or come off in the skirter's hands, though he intended only to trim.

B pieces are usually small, heavy-conditioned, dirty, short, or odd pieces



To produce good, bright wool, cleanliness in the woolshed is essential.

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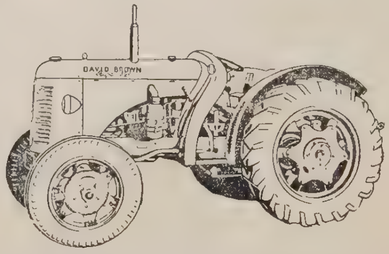

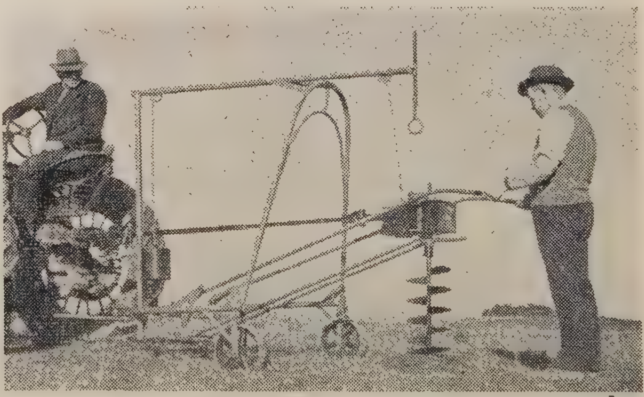

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and the crutch trimmings. Common sense rather than rules will determine what constitute B pieces.

Necks

The removal of neck wool should receive much more consideration than is usual. The neck is a collar piece and it is this fold alone that should go into the neck bin. The average neck should weigh about 1½oz., not, as is often the case, about 1½lb. Shoulder wool is usually the best part of the fleece and should not be removed. Taking off shoulder wool with the neck merely depreciates the fleece; it is one of the most common faults of heavy-handed or careless skirters, and growers should give this point particular attention. Necks that are free of seed, burr, or vegetable matter should be kept separate, as should hogget necks, which are usually finer than neck wool from older sheep, even if it means sending a small lot to the broker's bin.

Brands should be removed at skirting, but black wool, whether a small spot or large patch, should be left in and the whole fleece put aside as black wool. A black spot usually means further pigmentation (black fibres) throughout the fleece and wool of that nature may not interest buyers with orders for wool suitable for manufacturing into light-pastel-shade materials.

Rolling

The best form of rolling is that which can be done speedily and efficiently on the wool table, which will hold the fleece together, and which will present it to its best advantage. Custom does not change easily and it does not always pay to insist on changing the accepted practice. The much-used store roll has the advantage that many of the shed hands are accustomed to it and can do it speedily. Its principal disadvantages are that it presents the back wool and that it is easy for a presser forcing wool into the pack to put a foot on each side of the roll and break a fleece. When a fleece is folded in from both sides and then rolled from both ends the bulk of the wool showing is back wool and that is not a fair sample of the average fleece. Back wool is often the weakest part of the fleece and when rolling from both ends it is easy to exaggerate even a minor weakness and mar general appearance, this being particularly so with table hands who apply tension to produce tight, compact rolls.

It is not suggested that any particular roll will influence a wool buyer, but the shoulder roll usually presents a fleece to better advantage and gives a fairer sample of what the fleece contains. An important point in favour of the shoulder roll is that the fleece goes to the press in one roll, not in two rolls folded together, it is not easily split into two pieces, and there is less likelihood of fleeces being broken.

Both average and good table hands, after receiving instruction, have proved that the shoulder roll is as speedy as any other roll, that it gives a better general appearance, and that it holds fleeces together better.

Grading of Oddments

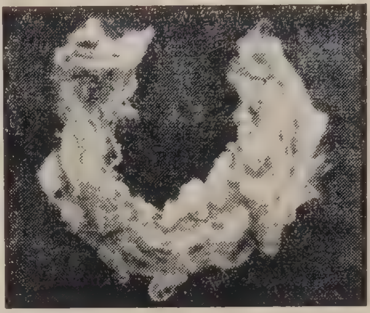
To secure correct grading of the oddments the necessary facilities must be provided. Convenient receptacles are essential for a thorough, workmanlike job, but the provision of them is not always a simple matter. Packs set in cumbersome frames, some hanging half closed against the wall or others held open by wires suspended menacingly from the rafters, are often the only equipment provided. If convenient means for disposing of the various lots are provided, it usually means that the job will be done, but awkward or cumbersome fittings tend to produce skimped workmanship.

Stained Pieces

The provision of a pack or bin to take stained pieces, including those marked by phenothiazine and bluestone, is important and, if the bin is conveniently placed, the board and table hands will usually dispose of all stains promptly and efficiently. Where facilities for dealing with stained pieces are inadequate they are often neglected and allowed to pass, marring other lines. Stained pieces are often damp, and, if pressed attached to bellies or with clean locks, pieces, or crutchings, contaminate much good wool. A useful arrangement for holding an odd pack for stained pieces is a frame built to fit snugly inside a pack. This holds the pack open until it is filled and tramped down. After the bale has been shifted near the press the frame is pulled out and set in another pack.

Bellies

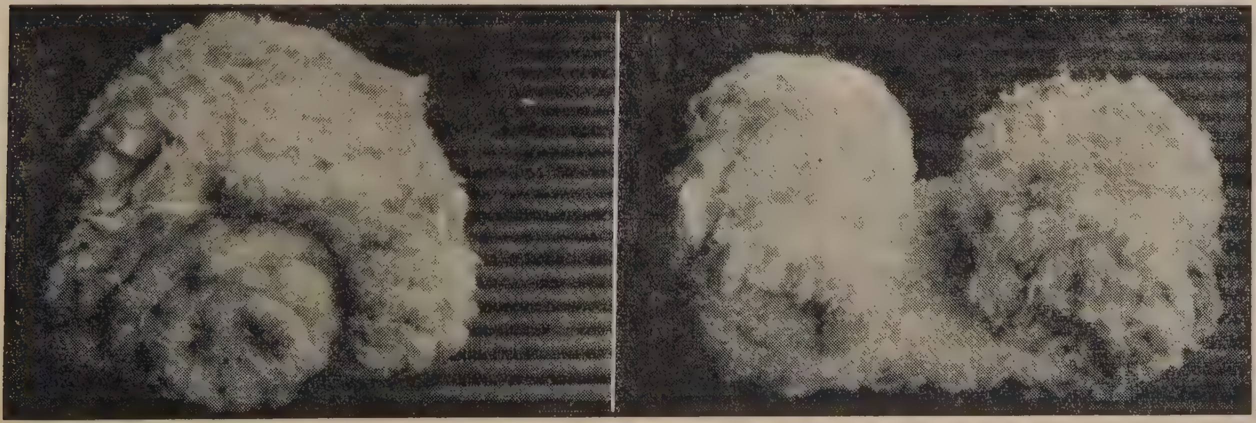
Bellies often receive less attention than they warrant. In many woolsheds they are disposed of direct from the shearing board, light, heavy-condition, free, and light- or heavy-seed types being mixed and carrying brisket-point stain and urine stains. The removal of stains from good bellies is important, and urine stains should always be removed. This should be noted by the small farmer who carries a few wethers and shears them with his ewes, as many bales of bulk ewe bellies are depreciated a grade because a few wether bellies from which urine stains have not been removed have been included. To deal satisfactorily with bellies it is possible in some sheds to build a platform above the catching pens on to which the board hands toss the bellies, which are then out of the way. They can be picked over and sorted when the rush of shearing is over.



An average crossbred neck; weight, 2oz.

Southdown Bellies and Pieces

On some fat-lamb farms where a few Southdown rams are shorn the pieces and bellies are folded up in the fleeces, which are then sent to the



Rolling. Left—Shoulder roll complete. Right—Store roll.

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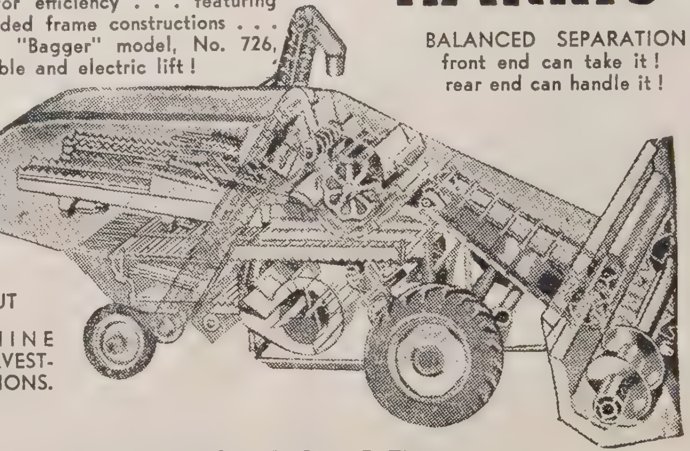

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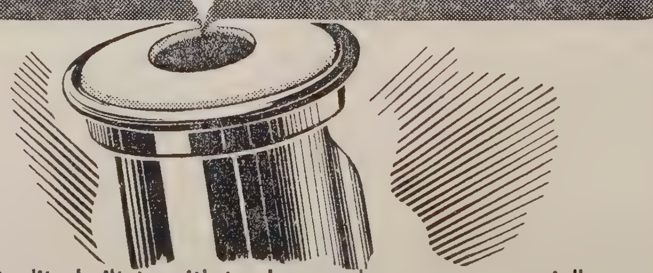

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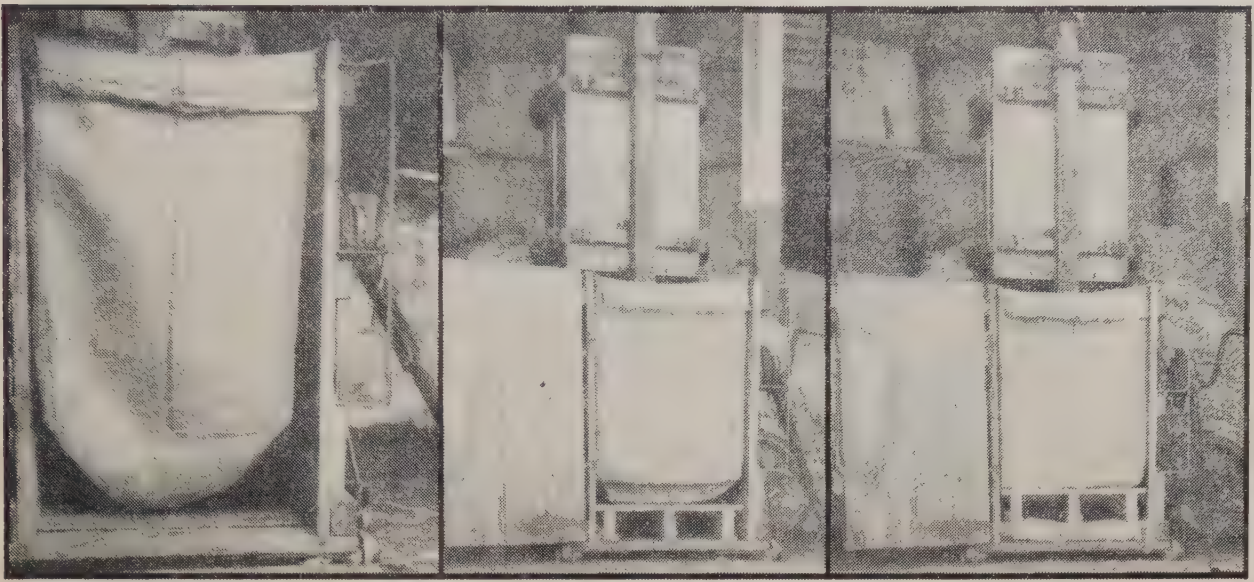
CARE OF WOOL ODDMENTS IN GROWER'S WOOLSHED



Left—A short pack fitted in the wool press without the false bottom. This type of pressing results in a round-butted bale that is difficult to handle, will not stand upright, and is difficult to stack. Middle—A short pack used with the false bottom adjusted for medium packs. This will give a slightly rounded butt and the bales may be difficult to stand upright. Right—A short pack fitted correctly with the false bottom packed up to suit the short pack common today. Correct packing of the false bottom is essential for good-shaped bales.

broker to handle. Enclosing bellies and pieces in rolled fleeces is not a good practice and causes needless waste of time and labour in the broker's store. Most brokers have a bin for Southdown bellies and pieces and much time would be saved if these oddments were separated in the bin bale. Because a few farmers fold Southdown bellies and pieces up in fleeces, it often means that much time is lost in brokers' stores opening all Southdown fleeces to see if they contain oddments. Southdown fleeces are often difficult to unroll after pressing and many good fleeces are broken when searching for rolled-in bellies and pieces.

Eye Clippings and Leggings

Eye clippings, which are also referred to as face pieces, wiggings, or topknots, should never be mixed with crutchings, pieces, or lambs. These face pieces are usually fine, fluffy, kempy, and light conditioned and are particularly undesirable mixed with good-quality lambs' wool, pieces, or crutchings. Good staff on the board will seldom let face pieces reach the wool table, as they generally fall loose on to the board at shearing. These face pieces must be kept separate and later sent to the broker, who makes provision for these and other small lots of oddments. Leggings, sometimes called stockings, too, should never be allowed to become mixed with lambs' wool, crutchings, pieces, or good locks, and should be separated. Some farmers prefer to have leg pieces left on the sheep, but where they are trimmed off on the board they should not be allowed to depreciate better-class oddments.

The sorting of good lambs' wool has paid appreciable dividends over the past season and there is every reason to believe that it will continue to pay. Good lambs' wool should be sorted on the board or picked over on the table, the longest, brightest, and best being made into the top line. Where efficient staff is available much of the seconds can be sorted on the board, advantages of this method being that there is a minimum of handling and it is not mixed with the good wool. In handling good lambs' wool attention must be given to the separation of any lot containing burr or seed.

Round-butted bales will not stand upright and are difficult to stack.

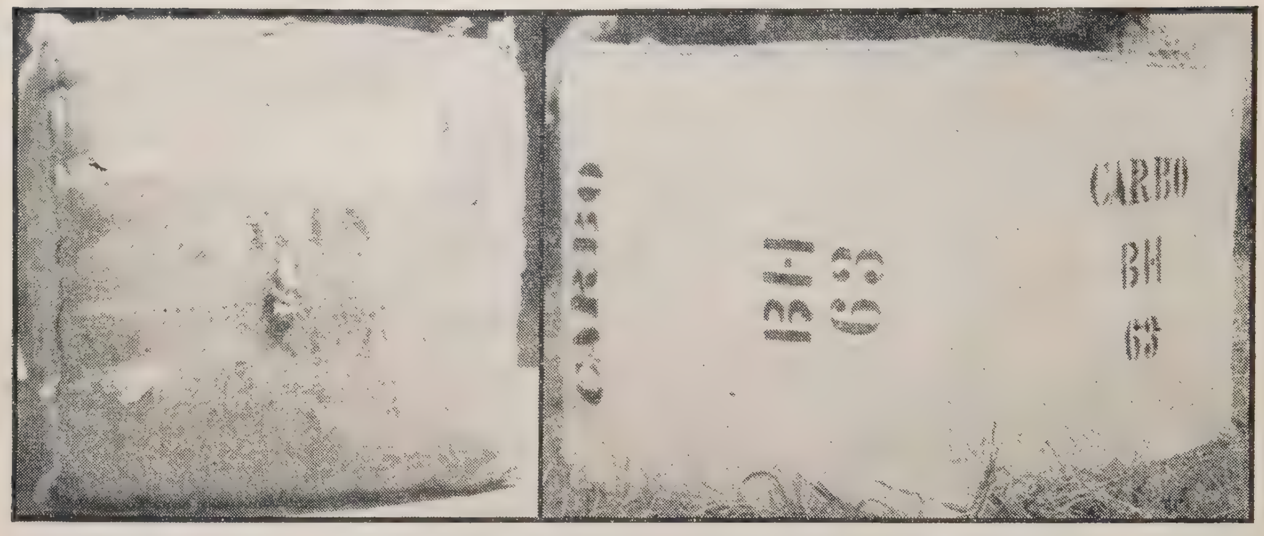
Crutchings and Locks

Just how far and how deeply crutchings should be sorted in the shearing shed is a much-debated point, but the prices realised at the past series of sales indicate that in the average shed it is profitable to sort out the shorts, face pieces, stains, and leggings. Many good lines of crutchings are spoilt by the inclusion of face pieces, which should be removed on the shearing board when any clearing of the face or eyes is done at crutching. Usually it is best to sort crutchings on the shearing board, where it is a fairly simple matter to separate the odds and shorts. Where sheep are cleared over the hocks the leg pads should also be kept separate. All stains should be removed. The same rules apply to fly crutchings, which, because they are usually short, are often over-sorted.

In larger sheds it may be possible to sort out a top line of the longest, cleanest, brightest, and best crutchings and where that can be done it is wise to do it. If a flock is inclined to show a considerable amount of strong britch wool, it may be profitable to separate the long, course crutchings, as they are often keenly sought after. Hogget crutchings should be kept separate. Face pieces, stains, and leg pads should be forwarded to the broker, who has bins suitable for these odd lines. All odd lots can go in the one bale or fadge, which is branded "bin" and, provided the various lots have been separated (a paper division is sufficient), the broker will dispose of them to best advantage.

Good locks deserve careful treatment and the lock bin should not be used for general discards. Good length, clean, and bright locks should not be depreciated by stains or sweepings.

CARE OF WOOL ODDMENTS IN GROWER'S WOOLSHED



Left—A typical example of what happens in transit when bales are type branded or numbered on the cap centre. In cap branding a 6in. circle in the cap centre should be left clear. Right—A well-pressed, well-branded, and well-sewn bale.

Use of Tar

Tar is a menace on or near wool and should be kept away from all shearing sheds. In many sheds it is common practice to apply tar to all shearing cuts, but it is not a desirable dressing and will not prevent fly strike. If growers feel that it is essential to dress shear cuts, it would be to general advantage to use something that is not harmful to wool.

Moreover, tar is an illegal woolmarking preparation and should not be allowed to come in contact with wool.

Pressing

Pressing is a subject that warrants more attention than it often receives. Many farmers would be surprised at the answers if they asked their younger staff: "What length pack fits the usual-type wool press?" Many of the younger hands have not handled or even seen any but the short pack common today; they do not realise that many presses were built to take long, medium, and short packs. The younger farmers and shed hands may have some excuse for ignoring to use a false bottom in the press for medium packs and for failing to do the additional packing of the false bottom which is necessary when using short packs, but older farmers cannot be excused for sending away badly-pressed, round-ended bales. Round-butted bales resulting from the use of short packs in a long press without the false bottom or without the false bottom sufficiently packed are difficult to load compactly, cause much heart-burning and unnecessary labour in the brokers' stores, and are a danger to life and limb in the block stacks.

Over-pressing good wool, particularly good lambs' wool and crutchings, is often false economy; under-pressing makes the bales difficult to handle and stack safely. One way of packing a good bale and striking an average weight is to place fleeces in the press systematically and keep a tally. If an average skirted fleece weighs 7lb., about 50 fleeces would make a good bale.

The present regulations allow a maximum bale weight for fleece wool of 400lb. with an allowance of an extra 50lb. for oddments.

Sewing

The manner in which bales are sewn is often a good guide to shed workmanship, good, even stitches showing interest in the work performed. Where a bale is marked for bin or reclass, good tight sewing with an ordinary loop or running stitch is sufficient, but where the bale is part of a main line destined for the show floor the stitching should be done in lock stitch. The corners should be pulled together neatly and firmly and the next stitch should be a firm lock stitch 4in. from the corner; the last-mentioned stitch is important for main-line bales and, if it were used by all growers, brokers would not have to employ extra labour putting it in when the bales are opened on the show floor. Opened bales are cut to within 4in. of the corner and a regular stitch there saves considerable time and labour. Approximately 8 stitches to each side will provide good sewing.

Branding

Regulations state that branding should be done in 3in. letters on the cap and one side only.

The general incidence of incorrect type brands on bales sent into brokers' stores is amazing. A-grade wool is constantly marked B, C, bellies or pieces, which causes much unnecessary rehandling and disruption of show stacks. Branding and numbering should be done by or supervised by a responsible person, as, apart from the unnecessary labour involved in reshuffling, bales of good-quality, high-priced wools can go under the auctioneer's hammer as inferior, low-priced lines.

All bales are not opened. Brand stencils should be neat and clearly defined and the brand applied with a fluid of correct consistency. Stencil numbers should be of the type which prevents confusion. When branding the cap of the bale an area in the centre of the cap 6in. in diameter should be left clean and unmarked, because type brands or numbers placed on the centre of the arched cap are apt to smudge or wear off, as it is the cap centre which rubs or takes friction in transit.

In the making up of wool catalogues and various report sheets growers' brands must be repeated and stencilled many times by brokers' office staffs. New growers, or old growers changing their brands, could assist materially in saving time and labour if they chose a brand that could be typed on an ordinary typewriter. Brands often have awkward flourishes, "eye-brows," hooks, and joined letters which could be eliminated, as they entail hand work and extra time at a very busy period.

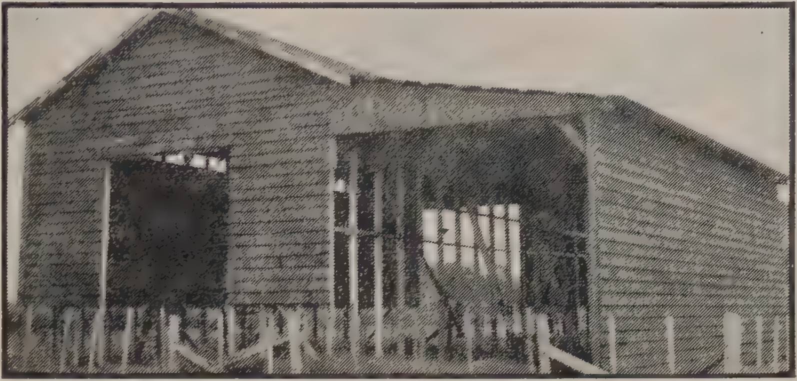
Specification Sheet

The specification sheet is much neglected. Many growers fail to complete this very important document, which, when properly made out, assists both the grower and broker. Correct details give the broker vital storage and stacking information and allow for speedy adjustment of branding errors. It is definitely in the grower's interest to complete this sheet and forward it with his wool or before dispatching it. The grower should state whether the consignment completes the line or approximately how many bales are yet to be forwarded. The specification sheet should be made out by the owner or classer, but not by pressers. If pressers make out specification sheets, branding errors are likely to be repeated.

When dispatched from the grower's woolshed the load of bales should be covered, irrespective of the weather; in dry weather dust penetrates the packs, and no chance must be taken of getting wool wet.

BUILDING WEATHERPROOF BARNS FOR BALED HAY

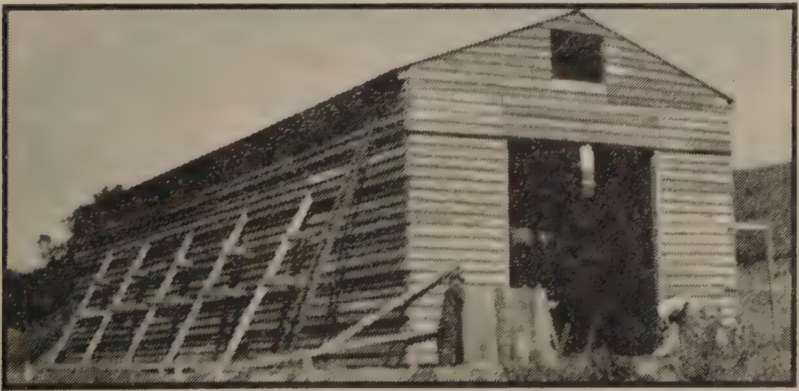
STORING baled hay successfully in stacks in the open field is not easy, and weatherproof barns in which it can be stacked with less trouble and kept in good condition indefinitely are highly desirable. Should the weather deteriorate during haymaking, where a baler and a weatherproof barn are in use there is the added advantage of being able quickly to get the hay already baled safely under cover. Baled hay in a weatherproof barn also has the great advantage over baled hay in a stack in the open, and to some extent over baled hay in a Dutch barn, that if not all is required for use in the one winter, the remainder will keep indefinitely. For these reasons hay barns are coming into more general use in New Zealand and many inquiries have been received for information about the kind of barn to build and how to build it. That information is given in this article by E. R. Marryatt, Fields Instructor, Department of Agriculture, Whakatane.



This type of barn with lean-to exemplifies the general scheme recommended for hay barns in New Zealand. Another lean-to, which could be built on the other side at no great cost, would greatly increase storage capacity.

SINCE the beginning of haymaking considerable man-handling of the hay has been necessary. This handling was greatly reduced by the introduction and general adoption of haymaking machinery and particularly of stacking machinery, but it has again increased with the advent of the hay press. Though baled hay is particularly easy to feed out, each bale usually has to be man-handled to some extent to get it in. Except where loading machinery is used, each bale has to be picked up and loaded on to a truck, then again picked up, unloaded, and stacked. However, once it has been loaded on to a truck it can be carted to a permanent barn just as easily as to a site in the open field.

The widespread use of stackers, which cannot be used to put hay into covered barns, led to the disuse of many Dutch barns. The growing use of the hay baler, on the other hand, is turning the thoughts and activities of more and more farmers toward the building of hay barns. Stacking of baled hay in the open has seldom been entirely satisfactory even when rain has been prevented from penetrating the roof of the stack. A tight cover of loose hay on top, the stack cover, and too close stacking of bales of too high a density often prevent free circulation of air and the outlet of dampness arising from sweating of the bales in addition to causing wastage on the sides and ends, rotting of the twine, and bursting of the bales. Indeed, sometimes it has been found difficult to obtain 200 good bales from a weatherproof stack of 1000 for the reasons given. In addition, the building in the open of a stack of baled hay which will neither let in rain nor break apart is a task requiring much painstaking work. In a closed barn less care in stacking is required, provided the bales are bonded together and spaces are left for circulation of air from the bottom upward.



This excellent 5000-bale barn, 24ft. x 80ft. with a 16ft. stud, is being built by two young farmers at a cost of about £350 for materials and the excavation into the hillside. The side walls are being fully louvred, as is shown by the shadows cast by the louvres on the completed side, and one louvre has been built above the doorway at each end. At this stage of building the doors were about to be swung.

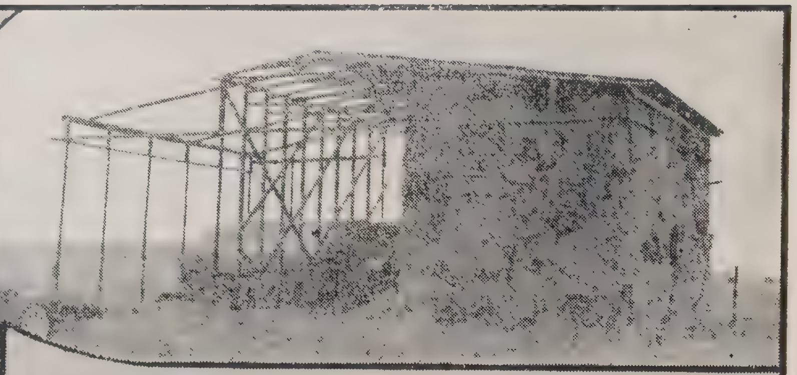
Advantages of Closed Barn

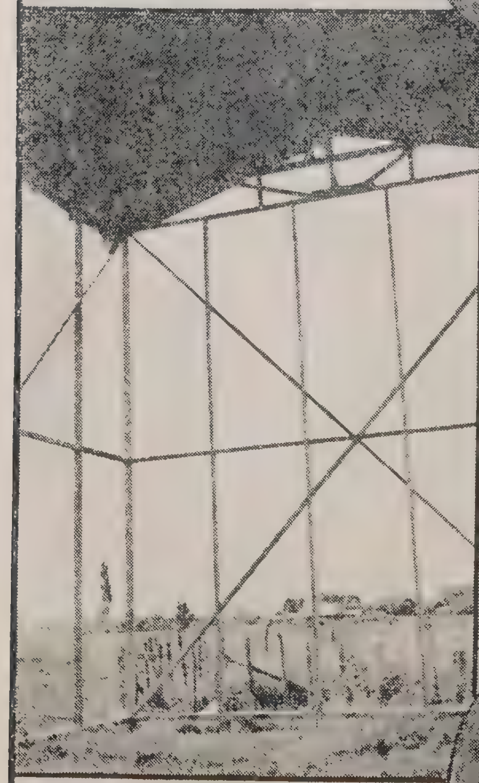
Though an open or Dutch barn is a big improvement on an open field, its apparently-lower cost of construction than that of a closed barn is not necessarily good economy. Obviously, open barns cannot give anything like the protection from the weather given by closed barns, and the outside bales, particularly on the weather side and end, often fall apart and usually are unfit for use. This loss can be reduced greatly by a good overhang and guttering along the eaves with downpipes from the lower ends; wooden guttering and downpipes are all that are necessary, but the wood should be tarred.

However, loss from weather can be eliminated by weatherboarding the sides. The additional cost is not high and is balanced to a great extent by the additional hay saved from the weather over the years and by the additional strength given to the structure. Furthermore, fire-insurance premiums are considerably higher for hay in an open barn than for hay in a boarded barn, and a boarded barn with doors or gates does not require a surrounding fence. If, on the score of initial expense or of planned later additions to the structure, weatherboarding is at first confined to the weather end and one side, even then the barn is vastly superior to an open one.

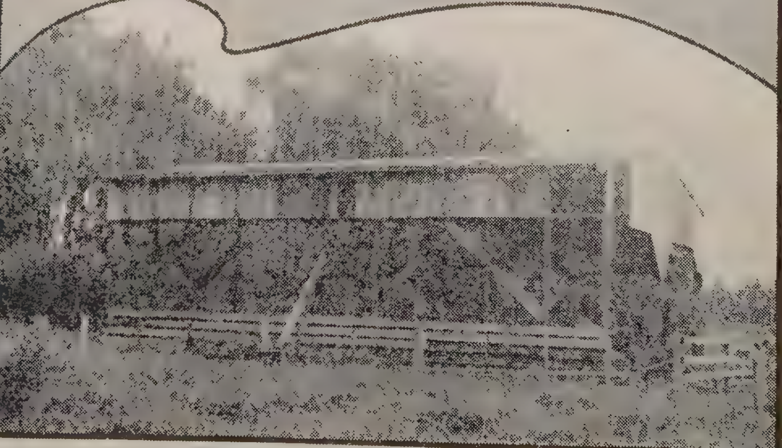
DUTCH BARNS

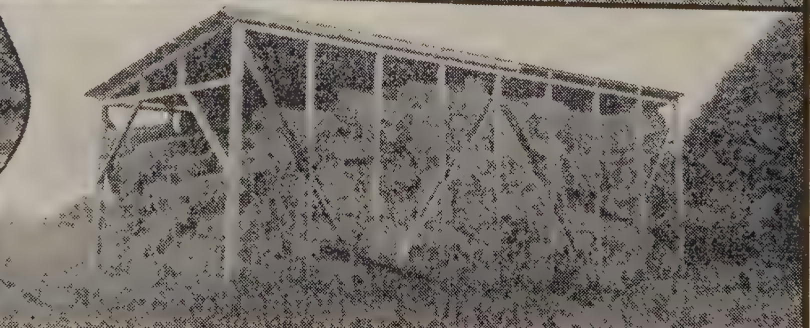
ARE NOT AS EFFICIENT AS ENCLOSED BARNS FOR THE PRESERVATION OF BALED HAY, BUT ARE BETTER THAN STACKS IN AN OPEN FIELD.





Above—An unusual type of barn being constructed with tram rails as uprights and an aluminium roof. Left—This very lightly-constructed barn is 40ft. x 20ft. with a 20ft. stud and has a capacity of 2000 bales. It cost £100 to build without taking into account the value of the used iron in the roof. Below—A satisfactory modification of a Dutch barn. This type is more efficient than the completely-open barns shown on this page. This barn is 40ft. x 30ft. with a 14ft. stud on a 9in. concrete base and centre. Materials cost £110. Bottom left—Wooden guttering to take run-off from the roof and direct it through a downpipe prevents a great deal of water from being blown into the bales at the sides of an open barn. The wood should be treated with a preservative. Bottom right—Weatherboarding at least part of this barn would enhance its protective value greatly. With no weatherboarding and no overhang or gutter, this barn protects very little of the hay from the weather and the roof may just as well, if not better, be laid directly on the stack.





One Barn or Two?

Two small barns may be better than one large one. Arguments in favour of this suggestion are: First, small barns are easier to build by ordinary farm labour; a farmer who is not an experienced builder may not realise the difficulties and the amount of scaffolding necessary in building a large barn with a high stud. Second, danger of the loss of all the hay by fire is reduced. Third, two barns may be situated in different parts of the farm, and this alone can considerably ease the labour of feeding out.

On the other hand, one large roof is cheaper to build than two smaller ones except when the farmer's labour is not a charge on the two smaller ones and tradesmen have to be paid to build the large one. Similarly, the higher the stud, the cheaper in proportion is the cost of construction of the storage space under the roof.

One large barn is better than two small ones where advantage can be taken of topography as in the illustration at the foot of page 363, in which to save labour one large hay barn is being built into the side of a hill on the same principle as for a silage pit. Here the bales will be stacked in the barn after being received down chutes from the hill above and a great deal of man-handling will be eliminated.

Storing baled hay successfully in stacks in the open field is not easy. Though this stack is covered by a reasonably-waterproof cover, no wire was used to tie the layers of twine-tied bales. Weather has rotted the twine, the bales have burst, and the outside walls have fallen away from the stack.

Weights and Measurements of Bales

As a basis for calculation in planning a barn certain weights and measurements of baled hay and yields per acre must be known, and this is rather difficult because of the great variations in size and weight of bales and in yield of hay. For ease of calculation it may be assumed that an average crop of pasture hay will yield 2 tons to the acre, that this will press into 53 twine-tied bales averaging 85lb. in weight, and that when they are stacked fairly close together, as is usual when hay is baled in stacking condition, each bale of at least 5 2/3 cub. ft. will occupy up to 7 cub. ft. in the stack. However, when hay is baled a day or more before it reaches stacking condition with the object of making better hay, density of bales must be reduced and spaces must be left between bales in the stack so that air can circulate freely and carry off heat and moisture. If bale density is reduced from 15lb. to 12lb. per cubic foot, the number of bales will be increased by about 20 per cent., and a reduction to 9lb. per cubic foot will increase the number of bales by about 40 per cent. Furthermore, in some districts 2 tons to the acre is an average crop, but allowances can be made for lower or higher yields and for looser baling and more open stacking.

Therefore, to allow 8 cub. ft. for each bale is generally a wise precaution.

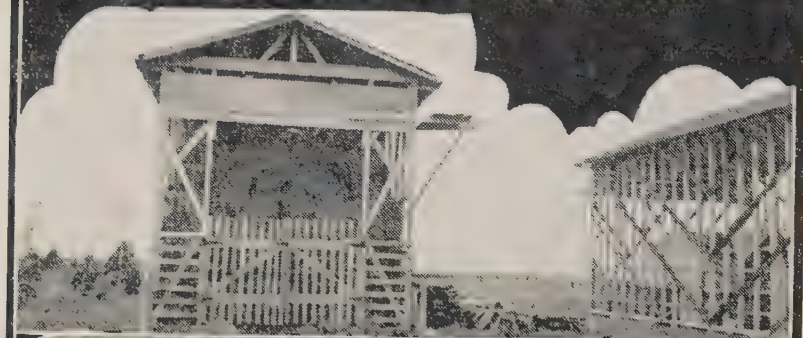
Capacities of Barns

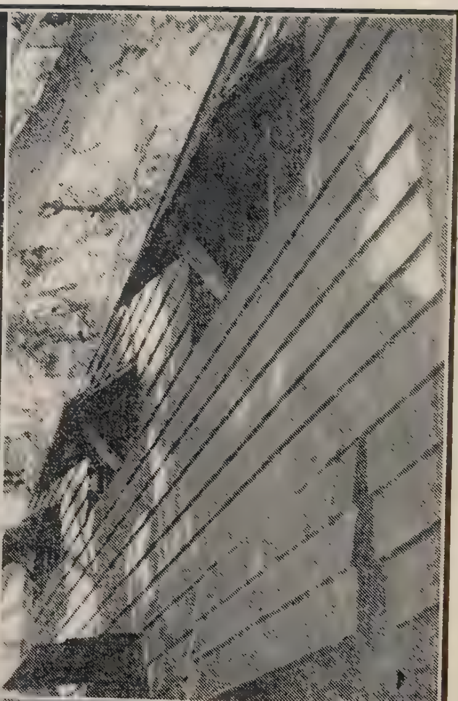
The barn illustrated at the head of this article is 40ft. by 23ft. with a 16ft. stud, giving a cubic content of 14,720 cub. ft. Dividing this by 7 on the basis of close stacking of high-density bales makes the calculated capacity of this barn about 2100 bales; it has been found to hold 2300. Using the divisor 8 on the basis of open stacking of low-density bales gives a calculated capacity of 1840 bales. It can therefore be considered to be about a 2000-bale barn. The lean-to along the length, 15ft. wide with a height dropping from 16ft. to 12ft., has a storage capacity of more than 7000 cub. ft. and therefore will hold about 1000 bales. A similar lean-to on the opposite side would give the whole barn a capacity of about 4000 bales.

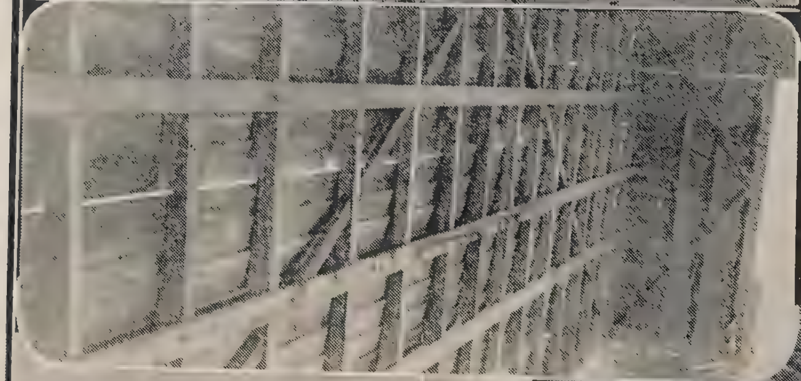
The dimensions of a barn to be built to suit the baled-hay requirements of a herd may be calculated in this manner: For a herd of about 100 cows where no silage is fed, about 4000 average bales of hay should be saved to have sufficient to feed about 1 ton of hay per cow with a small carry-over of about 4cwt. per cow. A suitable barn to cover this quantity of hay was referred to in the preceding paragraph, but as an example of how to calculate the dimensions a barn of 4000 bales

A simple barn 18ft. x 30ft. with a 14ft. stud, having a capacity of about 1000 bales. This barn can readily have lean-tos added at no great cost.

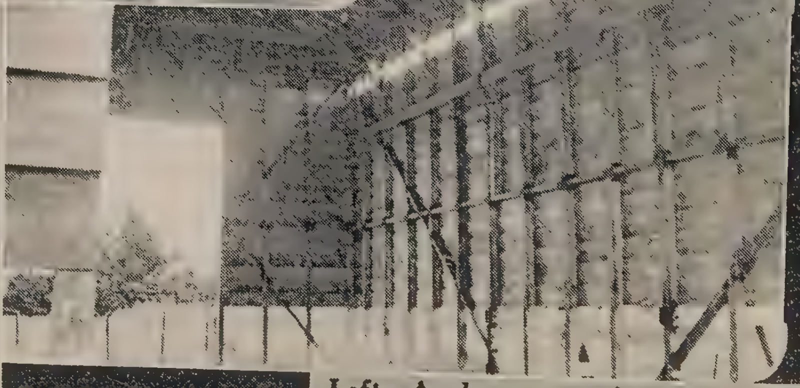
VENTILATION OF HAY BARNS







Upper left — Very well-planned barns being built with sides battened near the ground for ventilation and to keep stock from pulling the bales about. Upper right—In a weatherboarded barn the provision of ventilation is important, preferably at top and bottom. Hinged sections of weatherboard are sometimes used, but this method is not recommended. Above—The light shining through the wall shows the placing of the louvred openings for ventilation which run the length of this barn. This illustration also shows the 6in. x 2in. dwangs or runners which tie the studs together and distribute over many of them pressure caused by spreading of the stack of baled hay.



Left—A large weatherproof barn constructed recently. Sufficient ventilation may be obtained from the doorways, but no provision has been made for ventilation from the bottom to the top of the stacked hay, and for hay baled on the early side this is essential. Though the stud is not high, strutting and staying of the side walls are needed to resist possible pressure from stacked hay. Ventilation could be made adequate by removing the top and bottom weatherboards, and struts and stays could be added even at this stage. Above—Ventilation is provided in this barn at top and bottom. Ventilation is important not only for the good of the hay but also for the benefit of men stacking bales in the heat of summer.

WEATHERPROOF BARNS FOR BALED HAY

A hay barn should be on high or well-drained ground that will not cut up badly in winter. The barn in these two illustrations is ideally situated, as it is not only on high ground but also in the lee of tall trees and near the fields where the stock will be wintered. However, it has the disadvantage of having only one doorway. The barn contains some of the previous season's hay, and when the new season's hay is built on top of it this old hay will be unable to be reached and may have to remain there for years.

capacity without lean-tos will be considered. The cubic content of such a barn must be about 28,000 cub. ft. (4000 x 7). If a 20ft. stud is used, the floor area will be 1400 sq. ft. (28,000 ÷ 20), and this can be 25ft. x 56ft., 24ft. x 58ft., 23ft. x 61ft., 22ft. x 64ft., or any other factors of 1400 which may be convenient. However, building a barn with a stud higher than 16ft. is not recommended for the inexperienced farm carpenter.

Siting a Barn

To be useful a silage pit must be in or near the field likely to be cut for silage, but a barn for baled hay need not be anywhere near the fields likely to be cut for hay. The best place for the barn is where the stock will be wintered, so that feeding out will be easier. Carting the bales into the barn takes only a very short time—probably one or two days—and very few trips, but carting them out again extends over several months and requires daily trips.

Because hay is fed out during the winter, the barn should be built where the approach will stand up to constant use under wet conditions. Therefore it should be on high or well-drained ground that will not cut up badly. If it is built end on to the wet quarter, it will present less surface to the rain, and weatherboarding that end of the barn is less expensive than weatherboarding a side exposed to the prevailing weather; the best method, of course, is to weatherboard the whole structure. If a site can be selected in the lee of some tall trees, so much the better.

If new materials are to be used, a permit must first be obtained from the Building Controller. Application for the permit should be made through the District Building Controller.

Materials

Totara or puriri piles can be cut from fencing posts, four from each post, and so will cost about 1s. 6d. each at present. Concrete piles 18in. x 6in. square cost about 2s. each to make. Many farmers obtain all the rest of the timber from *Pinus radiata* on their own farms, and this seems to be quite satisfactory, particularly if painted with creosote or with red oxide of lead in waste oil.

For roofing, corrugated aluminium is now available at about £1 a sheet (8ft. x 2ft.), or 3-ply tarred roofing material can be used at about £3 5s. a roll (24ft. x 3ft.). Tiles, which cost £8 a square (10ft. x 10ft.), are too heavy for any but small barns, and even then are satisfactory only when the barn is fully enclosed to prevent the wind from lifting them. Tiles are not recommended for roofing hay barns. Corrugated asbestos is a better roofing material than corrugated aluminium, but is not obtainable at present. Rustic or bevelled weatherboarding can be used for roofing if the roof has a good pitch and if it is carefully laid and tarred and sanded annually.

Before using any of these materials a farmer should make himself thoroughly conversant with the peculiarities of the material and the proper methods of using it. For example, lead-headed nails must not be allowed to come into contact with aluminium roofing because of a corrosive electrolytic action which is set up between the lead and the aluminium. This may be prevented by using washers of felt or fibre between the two materials.

Construction Notes

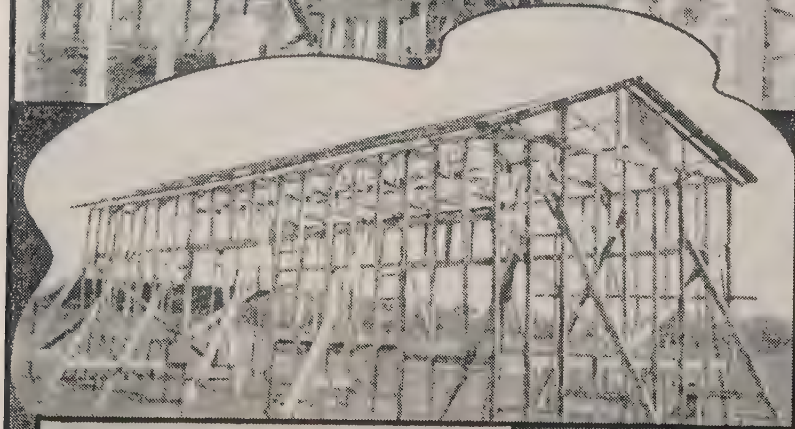
The piles should be 18in. x 6in. square with a tar or building-paper damp course on top. To carry a building to house 4000 bales the piles should be placed at not more than 3ft. centres.

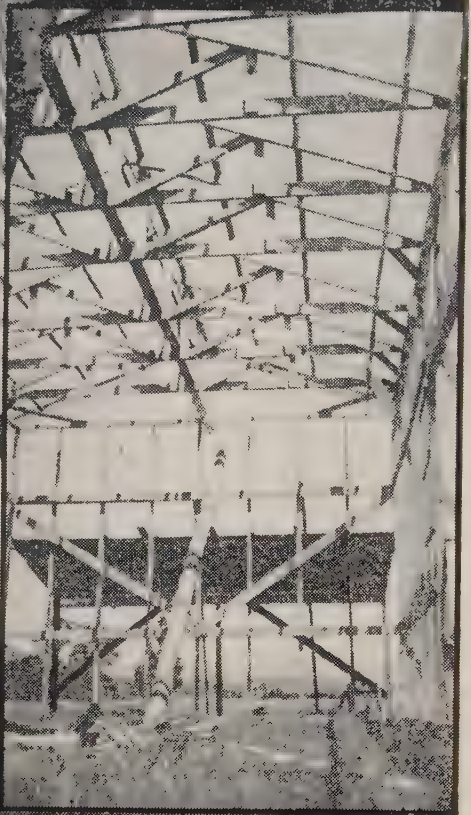
The bottom plate should be 6in. off the ground, of 4in. x 3in. heart timber, and halved at the joins.

The top plate may be of 4in. x 2in. timber and should be halved.

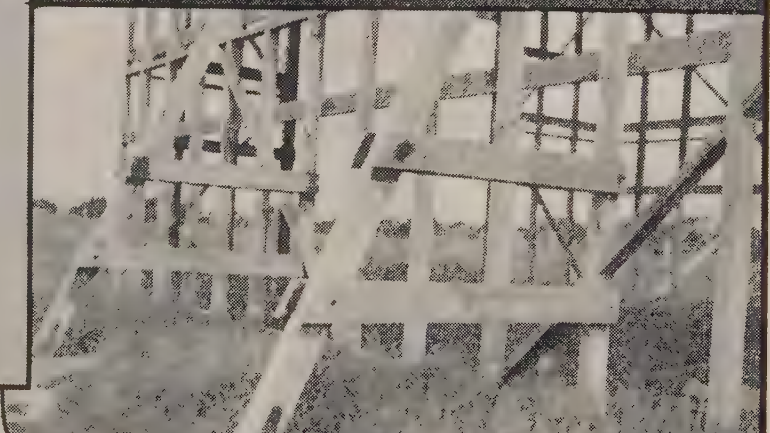
A lean-to is being added to this barn, and part of the new roof is being used as the roof of a maize crib which is being built along the outside wall of the lean-to and inward as far as the second end-wall stud.

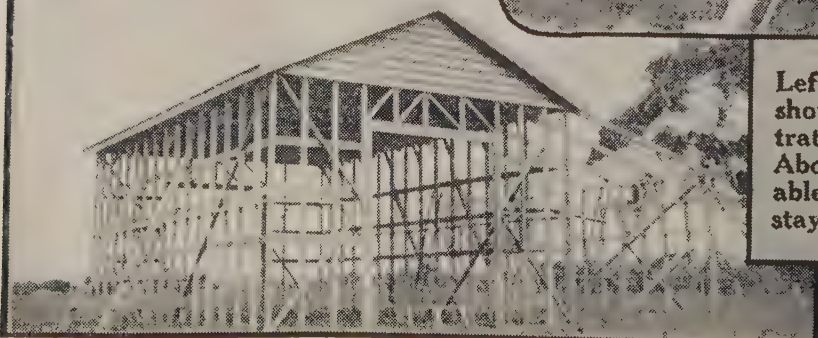
CONSTRUCTION DETAILS OF HAY BARNS





Upper left—This view from just inside the doorway of the lean-to in the illustration at the head of this article shows some of the details of construction. Upper right—A fully-principalled roof. An implement shed is being built at the far end. The gum pole lying against the framework is one of those that were used with a tractor and tackle to raise the principals, which were built on the ground. This barn has a doorway on each side. Above—The system of strutting and staying recommended.

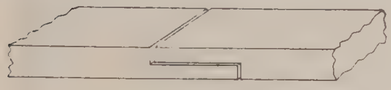




Left—A barn similar to that shown in the upper left illustration under construction. Above—A close-up of a desirable method of strutting and staying framework of a barn.

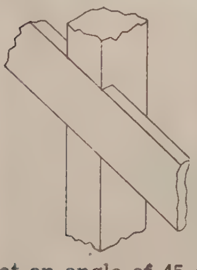
WEATHERPROOF BARNS FOR BALED HAY

Rustic or bevelled weatherboarding (left) can be used for roofing hay barns if the roof is given a good pitch, if it is laid carefully, and if it is tarred and sanded annually. Tiles (right) are too heavy for any but a small barn, and even then only when the barn is fully enclosed to prevent the wind from lifting them.



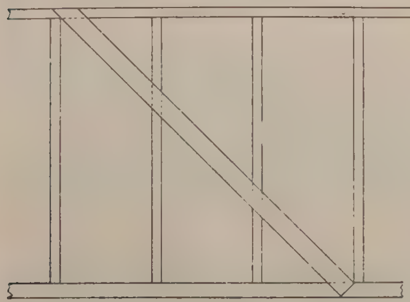
A join halved or scarfed.

Studs should not be less than 14ft. high and of timber not larger than 4in. x 2in. except at openings, where 4in. x 3in. material should be used.

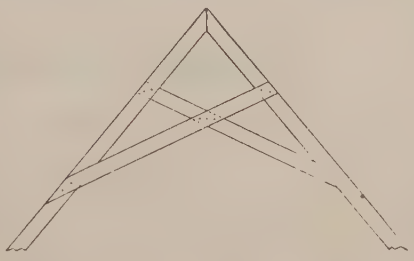


The braces should be checked into the studs and plates to the thickness of the braces. They may be 4in. or 6in. x 1in. for this purpose, or 4in. x 2in. material may be cut to fit between the studs. Each wall should be braced two ways with braces at an angle of 45 degrees.

The roof may be of a semi-principal type with an 18in. overhang or it may be fully-principalled. If 3-ply tarred material is used for roofing, only one layer is needed, and it should be tarred and sanded annually for best results. For such a roof the rafters should be at 6ft. centres with purlins of 3in. x 2in. or 3in. x 1½in. timber every 3ft. This frame should be lined with rough 1in. timber running up and down. The roofing material should be laid lengthwise rather than from eave to eave, but if it is laid from eave to eave, it should be battened; galvanised clouts and adhesive are sufficient to hold material laid lengthwise. Tarring and sanding complete the waterproofing of the roof, but a gutter should be fixed to each eave if the sides are not to be weatherboarded or if lean-tos are not to be built on to the main structure. If corrugated aluminium is to be used, rafters should be at not more than 4ft. centres and purlins at not more than 2ft. centres; no lining is necessary.



A 4in. x 1in. brace checked at an angle of 45 degrees (or as nearly as possible) into a 4in. x 3in. bottom plate, a 4in. x 2in. top plate, and the studs.



The framework of a semi-principalled roof.

One farmer who has built two large barns—the only structures he has ever built—recommends building the principals on the ground as he did for his second barn and then hauling them up with the aid of a tractor, poles, pulleys, and wire cable or with a hay stacker which has a high lift.

Doors or gates are usually built at the ends to allow for the construction of lean-tos at the sides. An alternative method is to build the entrances midway along the sides and lean-tos at the ends, but end doors are recommended. To have only one doorway is not wise because if all the hay is not used, the new season's hay must then be stacked on to the old and used before it. Doorways should be not less than 12ft. square.

Struts are necessary on the outside walls at intervals depending on the size of the building. A good method of strutting is illustrated on this page.

Weatherboarding should be done preferably with 9in. x 1in. timber. Adequate ventilation must be allowed for, particularly at top and bottom, and an excellent method is to louvre the entire length of the walls on each side at least after the fashion of a venetian blind. The louvre can be made by sawing 2ft. 6in. lengths of 3in. x 2in. timber diagonally through their width to form wedge-shaped lengths. These pieces are then nailed perpendicularly one below another on the walls, with the thin ends at the top, and serve as foundations for the weatherboards. Four boards of 9in. x 1in. timber are nailed on to these foundations, the first board being nailed at the bottom of a louvre and the other three boards placed above so that each overlaps the next by 2in.

B grade rimu or pine may be used for all construction except the bottom plate, for which only heart timber should be used.

Flooring: A barn built on high ground usually has a fairly dry floor, which sometimes may be improved by drainage. A permanent wooden floor to a barn is not recommended, as it would need to be very substantial to take the traffic of trucks and the weight of baled hay and therefore would be unduly expensive. Usually an earthen floor is all that is required, but a concrete floor would be ideal.

Essentials of Stacking

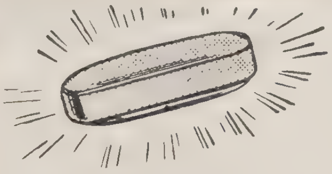
Whatever the type of floor, the bottom layer of bales in the stack should be kept away from it by some means. Frequently this is done by using loose hay for a base, but preferably it should be done by laying timber, creosoted to resist decay.

The essentials in stacking baled hay inside a building are:—

A dry, level, and firm foundation to keep the bottom bales off the ground.

Provision for free circulation of air around all bales from the bottom to the top.

Bonding the stack by placing the bales in each layer at right angles to those in the layer below.



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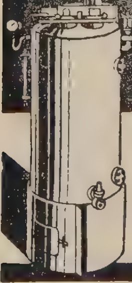

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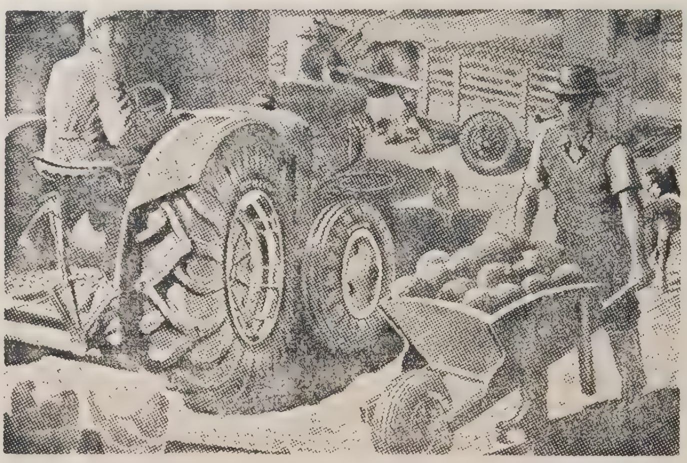

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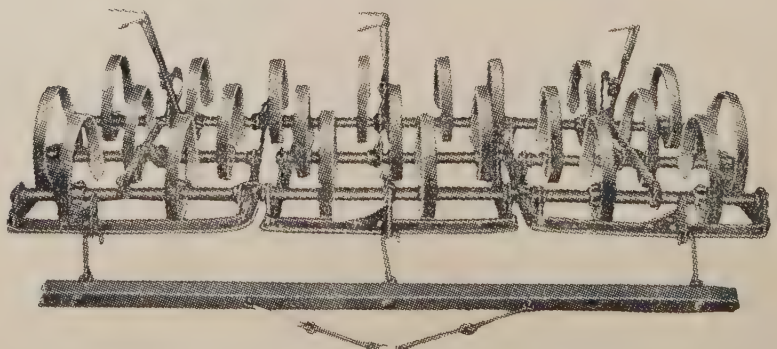

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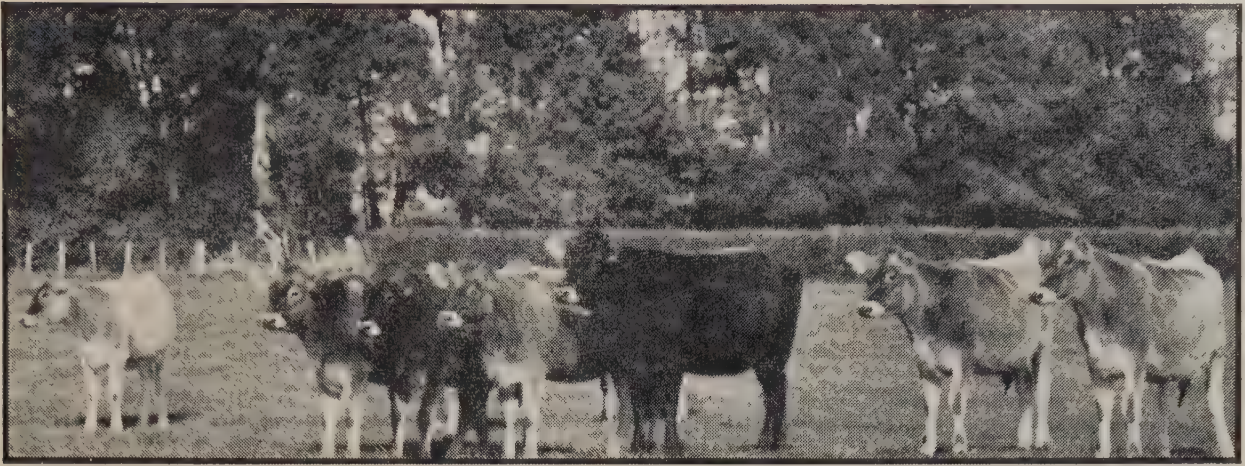
Benefits of Rotational Grazing in Calf Rearing



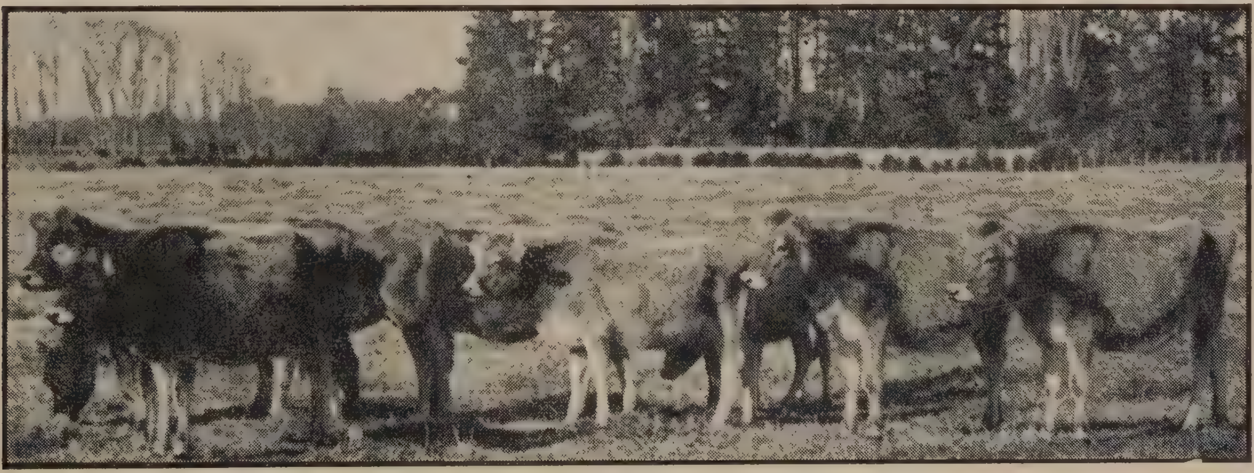
SUCCESSFUL calf rearing calls for attention not only while the calves are being bucket fed, but throughout the first year of their lives, and particularly during the first summer and autumn. The value of rotational grazing in preventing the decline in condition which is common at this most important period of the calves' lives is emphasised in this article by C. E. Ballinger, Instructor in Agriculture, Department of Agriculture, Stratford.

MANY farmers have comparatively little trouble with calves while they are on the bucket, and if scours are troublesome, they can be dealt with successfully by more attention to cleanliness of buckets and bails, regulation of the milk and meal ration, and the use of sulpha drugs. The period when serious difficulty is experienced is between December and May, and is the most important period of the calf's life. During this time the most persistent troubles with calf rearing occur, though the effects often are not seen until the late-autumn flush, when the farmer finds he has a group of scouring, unthrifty calves. Such calves rapidly lose condition, refuse to eat, and in the final stages stand at the water trough and sip water continuously. A great deal of care, good feeding, and periodic drenching are then required to bring them through the winter without a high rate of mortality.

The trouble is fairly general in dairying districts, but is worse where the autumn is hot and dry and paddocks become bare followed by an autumn flush in April and May. Where rainfall and cool conditions make for better autumn growth, or where paspalum is available, the trouble is lessened to some extent and can be avoided more easily.

Effect of Management

Where the incidence of this condition is greatest the management is somewhat as follows: While the calves are on the bucket they are confined to a calf paddock convenient to the milking bails. The paddock is usually small and fertile and is grazed heavily with stock the year round. Pasture growth in spring is good and the paddock either becomes overgrown and rank or is overstocked and kept bare; in either case the calves are not given the best start in life. As the season advances, pasture growth slackens and the best grass is retained for the dairy herd. The making of silage and hay does not allow much spare time, and the calves are kept in a convenient paddock in which there is "plenty of good rough feed." Calves are not good grazers, and the paddock becomes a patchwork of ungrazed roughage and small-overgrazed areas. The area being grazed is probably 20 to 30 per cent. of the



The well-grown condition of the rotationally-grazed calves in the upper illustration is in contrast to the poor growth shown by these set-stocked calves.

ROTATIONAL GRAZING OF CALVES . . .

paddock. No trouble is apparent in the early stages, but the calves do not thrive, they lose condition and become pot bellied, and the eyes become dull. The trouble is then sheeted home to worms and the calves are drenched.

This condition can be prevented by building up the vigour of the calves to the stage at which they are resistant to such troubles as worm infestation and scours, which are only secondary effects of poor nutrition in the early stages of the calves' lives.

Preventive Measures

Though the trouble may not show up until autumn, preventive measures should be undertaken much earlier, and the method which has given very satisfactory results in both experiment and practice is rotational grazing of the calves ahead of the milking herd. The calves then have the choice of the best pasture, which is as free as possible from fouling and contamination, and thus are encouraged to graze the best grasses and clovers. Rotational grazing should be started in October. Though some difficulty may be experienced in training the calves to be driven for the first week, they will soon settle down to driving as quietly as the milking herd.

The benefits of this treatment have been demonstrated at the Department of Agriculture's Animal Research Station, Ruakura, in trials since the 1940-41 season. Variations in the method have been tried, but in general a straight-out rotation ahead of the milking herd beginning in October has given the best results. Groups of calves confined to one or two paddocks have been compared with groups rotated around the dairy paddocks and progress checked by periodical weighing. A typical growth curve is shown on this page. The benefits of rotational grazing are demonstrated by the superior live-weight gains of the calves in the rotationally-grazed group, which by April 17 were an average of 88.7lb. heavier than those in the set-stocked group.

The advantage of having calves in April in the superior condition obtained by rotational grazing will be appreciated by farmers who have had trouble with calf rearing. Such calves do not require drenching and they winter without trouble, providing they receive good hay and silage and a picking of grass. As yearling heifers they are well grown for mating, and a heavier bull can be used with them than with poorly-developed stock.

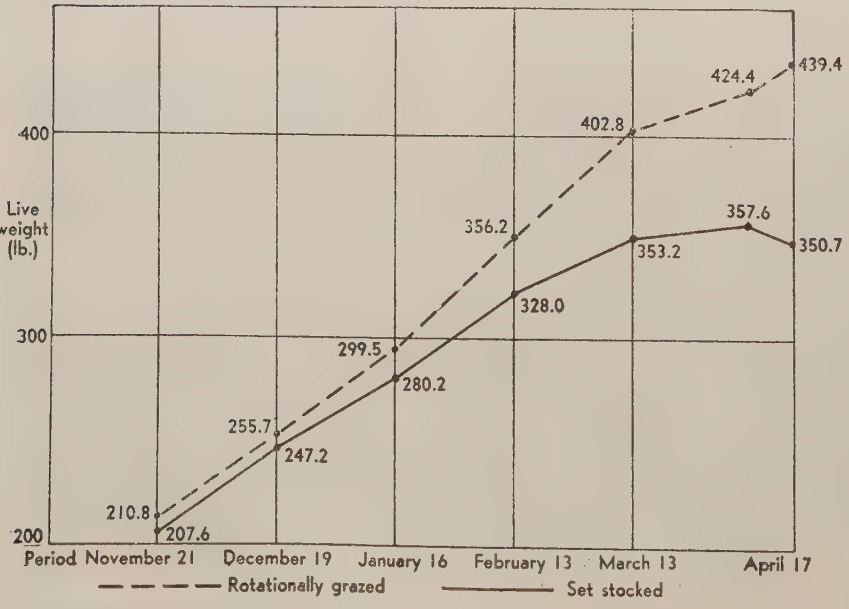
Feeding in Dry Seasons

In very dry seasons when pasture growth is poor, rotational grazing may be considered not worth while, but that is not so. Rarely does growth stop completely, and the fact that a paddock is a fresh one is an incentive to a young animal to forage. In a very dry season supplementary feeding to maintain vigour in young stock is just as necessary as hand feeding the milking herd to maintain its milk yield. Further, the supplementary feed should be of the best quality or the calves will not eat it and semi-starvation starts the common decline in condition. Good silage is quite satisfactory, and if calves will not eat silage, the farmer should ask himself if the silage is good.

Whatever is offered to the milking herd should be given to the calves. If good-quality silage is not available, a good protein concentrate should be obtained and the calves brought to the bails and fed a basic ration of 2 to 3lb. a day in addition to hay and silage. Poor hay is not sufficient. The inclusion of meat meal in the ration from the early stages of bucket feeding is a good practice; then calves can be changed to any concentrate mixture containing meat meal without difficulty.

AVERAGE LIVE WEIGHTS OF ROTATIONALLY-GRAZED AND SET-STOCKED CALVES

Animal Research Station, Ruakura, 1940-41 Season.



Modification of Rotational Grazing

Some farmers effect a compromise with rotational grazing by running the calves with the milking herd. This method has the advantage of easy handling when the stock are driven around the paddocks, but has the disadvantage that the milking cows are better grazers, selecting the best pasture and quickly fouling what is left.

This practice is often extended in autumn for both the herd and the calves by giving them free range of the whole farm. This also has disadvantages for both stock and pasture, as the basis of proper pasture utilisation is spelling the pasture for recovery and giving the stock fresh grazing. Stock can quickly be conditioned into almost any habit. If made to graze out one paddock at a time, they will do so, but if allowed free range at first, they resent being confined afterward and will look for fresh pasture when a paddock is only half grazed.

RADIO BROADCASTS

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

November 2—"Current Farming Problems for the Month," by E. B. Glanville, Assistant Fields Superintendent, Department of Agriculture, Auckland, and H. Woodyear-Smith.

November 9—"Pony Clubs," by Evelyn E. Moore, Rural Sociologist, Department of Agriculture, Palmerston North.

November 16—"Some Aspects of Poultry Farming," by S. G. Haddon, Poultry Instructor, Department of Agriculture, Auckland.

November 23—"Progress of the Young Farmers' Clubs Movement," by S. Freeman, Dominion Organising Secretary, New Zealand Federation of Young Farmers' Clubs.

November 30—"The Story of Honey," by W. J. Fix, Apiary Instructor, Department of Agriculture, Auckland.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Thursdays at 12.40 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

"PRIMARY PRODUCTION IN NEW ZEALAND"

The latest edition of "Primary Production in New Zealand" provides a compact but comprehensive picture of the organisation of the Dominion's primary industries. It deals with all aspects of land utilisation, the manufacture of products from farms, and marketing procedure. A special section deals with prospects for immigrants who wish to take up farming in New Zealand. The publication is well illustrated and contains a large number of maps. A wide range of statistical information has also been provided. Copies can be obtained from main district offices of the Department of Agriculture for 2s. 6d., post free.

The Culture of Chokos

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland.

THE choko is a perennial trailing plant belonging to the order *Cucurbitaceae* or cucumber family and is indigenous to Central America; botanically it is known as *Sechum edute.* In growth it is somewhat similar to the vegetable marrow, though very much more vigorous. The flower is small and pale yellow and the fruit is rather uneven with a rough, prickly skin of varying colour from creamy white to a light green. The fruit is solid with a fine-textured, light-green flesh. It is prepared and cooked in the same manner as the vegetable marrow and has a very delicate nut-like flavour.

[*Sparrow Industrial Pictures Ltd. photo.*

A choko plant that has been trained over a hedge. The fruits are nearing maturity.

YIELDS from the choko plant are prolific and 1-year-old vines may yield up to 100 fruits each; with well-established plants it is not unusual to obtain up to 600 fruits per vine. The fruit has one single seed, which often germinates before the fruit has fully matured. Although the choko plant is frost tender, it can be grown quite well in localities where only light frosts are experienced. In the colder districts the stems die back in the winter, but shoot from the roots again the following spring.

In the West Indies it is cultivated not only for its fruit, but for the roots, which often attain a weight of 20lb. These large fleshy roots contain a large proportion of starch and have a flavour somewhat similar to a chestnut. Both roots and fruit are used extensively by the natives of the West Indies, where they are considered wholesome articles of diet. The choko is also very popular in certain parts of Australia, where in warm districts such as northern Victoria the vines bear fruit almost the whole year round.

Although not grown commercially in New Zealand to the extent that would be expected, the choko plant is common in many home gardens around Auckland. Being easily propagated and having reasonable immunity from disease and good keeping qualities, it is a useful vegetable, supplementing the supply when other vegetables are scarce or providing a variation of diet if desired.

Suitable Soils

The choko will grow in most well-drained soils, but prefers a fairly free loam with an aspect sheltered from the south and westerly winds and exposed to the maximum of sunshine; a slight northerly slope is an advantage. Good drainage, together with a high moisture-holding capacity in summer, is essential.

Lime

As a large amount of organic material is used for the growing of chokos, lime should be used to correct any acidity. The form in which it is applied must be determined by conditions. If quick results are desired, the use of burnt lime or hydrated lime may be advisable, but under most conditions carbonate of lime (ground limestone) is satisfactory, and an annual application of from 3 to 4oz. per square yard will usually be found sufficient. It is a better practice to make annual applications than to give heavy treatments at infrequent intervals. When burnt or hydrated lime is used in place of carbonate the quantity should be from 1½ to 2½oz. of burnt lime or 2 to 3oz. of hydrated lime per square yard.

Land Preparation and Manures

For the establishment of the choko plant prepare a large shallow hole about 4ft. in diameter and 12in. in depth or a 6ft. trench 12in. wide of the same depth. If the subsoil is hard, it should be loosened to a depth of 12in. to allow for better soil drainage and root action.

The trench or hole may be filled with prepared compost, well-rotted stable manure, or a mixture of sheep manure and straw, over which is spread 2lb. of bonedust. The manure is then covered by 6in. of topsoil, which is raked down. For commercial planting long trenches 8ft. apart may be prepared and the plants set out at 12ft. intervals.

When danger from frost is past the chokos are planted with the sprouted end uppermost and covered with 3 to 4in. of soil.

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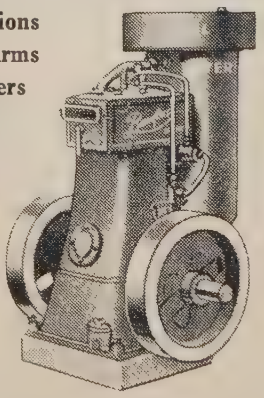

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Supports

Chokos should be trained over a support such as a trellis or pergola, though in the home garden the plants are often set out on the sunny side of sheds, hedges, trees, or rock walls and allowed to climb over them. If permitted to creep over the soil, both foliage and fruit are liable to be damaged by insect pests and soil rots.

For commercial production the pergola system is generally adopted, the vines being planted along the sides of the pergola at 12ft. intervals and trained up the sides and over the top. The height of the pergola should be 6ft. and a suitable width is 8ft. To secure sunshine on both sides of the pergola it should be constructed to run north and south.

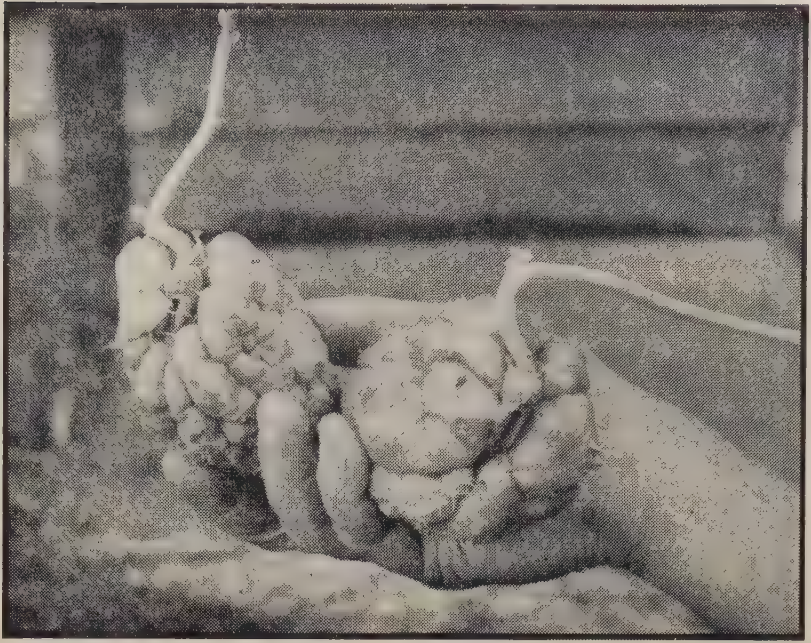
The use of 7ft. dry manuka bushes attached along the outsides of the pergola and over the top will provide suitable shelter and support for the climbing vines. If bushes are not available, light manuka stakes may be used and should be spaced 1ft. apart.

As the plant is a perennial and bears the crop on the current season's growth, it is an advantage to prune it each year to within 1ft. of the base. This should not be done until just before the new season's growth commences, usually in September. Early pruning is likely to induce growth before the danger of damaging frosts is over.

For the first year the plants will not make the profuse growth that is characteristic in the second and succeeding seasons; to prevent dense growth sufficient support for its development must be provided.

Cultivation

Cultivation consists of hoeing and shallow inter-row cultivation when necessary to check weed growth and to aerate the soil. Frequent watering may be necessary during long periods of dry weather to maintain adequate soil moisture.



[*Sparrow Industrial Pictures Ltd. photo.*

Choko fruits well sprouted and ready for planting.

The choko plant requires adequate feeding, and annual dressings of animal manure up to 20 tons to the acre (10lb. per square yard) or a complete fertiliser mixture such as blood and bone and superphosphate in equal parts and 1/20 part of potash (sulphate or muriate) should be applied at the rate of 1 ton per acre (½lb. to the square yard). Where the trench system is practised the fertiliser can be spread between the rows and worked into the top 4in. of soil; deep cultivation is liable to cause damage to the roots of the choko.

[*Sparrow Industrial Pictures Ltd. photo.*

Where space is limited a shed makes an ideal support.

Harvesting

By May the choko fruits are fully grown and should be carefully gathered before they commence to fall. For market they may be packed in the No. 6 case (7in. x 7in. x 18in.) or other suitable containers. The No. 6 case holds 1½ dozen fruits.

To store chokos for a lengthy period they should be placed in a sunny position for about 5 days to mature thoroughly and then packed into boxes between layers of dry sawdust and stored in a dry shed; if stored without this covering, they are liable to shrivel. By this method the choko will keep in perfect condition until September, when they will begin to sprout.

As chokos are not subject to attack by any serious pests or diseases, no spraying or dusting is necessary.

◆

SUBSCRIPTION RENEWALS

Renewals of subscriptions to the "New Zealand Journal of Agriculture" should be paid to the nearest office of the Department of Agriculture. Subscribers can ensure continuity of delivery by paying their subscriptions as soon as possible after receiving their renewal notices and at least one month before the old subscription expires. When payment is made the renewal notice should accompany the subscription to ensure that the correct details are recorded.

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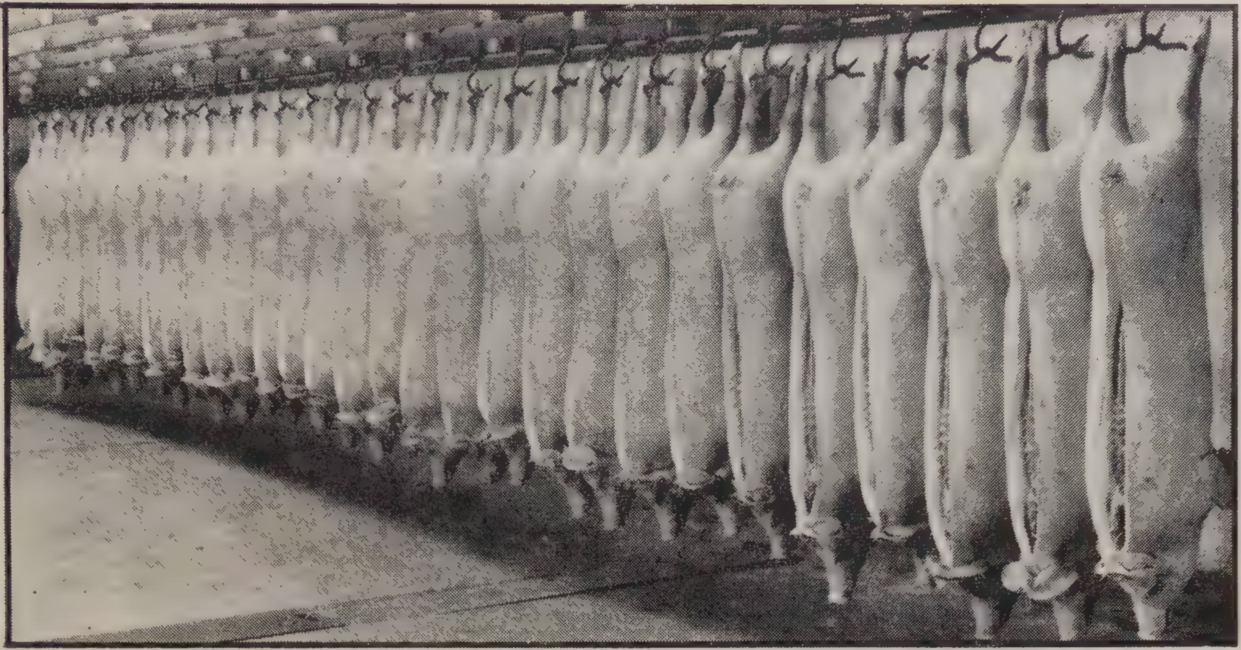

HEADING PHOTOGRAPH: This clean line of pigs, dressed and inspected and ready to go into cold store, is the result of good husbandry. Sparrow Industrial Pictures Ltd. photo.

Avoiding Losses through Condemnation of Pig Carcasses

ABOUT 20 per cent. of all pigs born in New Zealand die before weaning; a further 10 per cent. die on the farm after weaning. All the causes of these losses have not yet been ascertained, though a survey which is to be completed in 1950 should provide more detail. It is already apparent that the losses on the farm are a most serious drain on the efficiency of the industry and amount in total to far more than the losses resulting from condemnations and rejections in those pigs which reach the works. Here the position is accurately known as a result of records compiled by the Meat Inspection Service. On the killing sheet returned to the farmer from the works the reason for any condemnation or rejection is shown by abbreviations. This article, contributed by the Livestock Division, explains the significance of these abbreviations and deals with the diseases or conditions causing condemnation or rejection. A later article will deal with the control of minor ailments affecting pigs on the farm.

WHEN killing sheets are received from the works by the pig farmer they show a series of abbreviations at the bottom which indicate exactly why pigs were rejected or condemned and the weight of what was left of partially-condemned pigs. If the cheque accompanying the sheet is smaller than was anticipated, the farmer can be sure that there has not been an error. Freezing companies and bacon factories have evolved foolproof systems of identifying every client's line; the farmer's loss is also theirs, as they have less to export and more labour to expend on salvaging what is left.

Closer study of the sheet will show why the sum on the cheque is not as large as anticipated. The same abbreviations are used by nearly all firms and pig-marketing associations; some are self-explanatory or are explained, but if the meaning is not clear, the companies will be glad to elucidate. The farmer's goodwill is the life of their business, and a satisfied client is a good form of advertising. The farmer should therefore not be afraid to ask questions if he is in doubt.

Where possible the pig breeder should go into the works and see his own pigs inspected and graded. Finding time for that may be difficult, but he has spent months looking after the pigs and a few more minutes spent in this way may save much time in the future. The meat inspector, whose job is not simply to reject or to condemn, but the much more difficult and skilled task of knowing what can be salvaged safely, will explain reasons for rejection, condemnation, and grading. Seeing carcasses of his own pigs affected with disease is likely to make a greater impression on a farmer than reading an account of the disease.

About 20 of the main diseases and conditions causing loss to pig producers, together with measures for their control, are described in this article. Further advice on the prevention or curing of these conditions can be obtained from the local veterinarian or Stock Inspector.

Pig producers should make full use of the services of the supervisor of the local district pig council, who can advise on such matters as design and management of the piggery to ensure that the hygienic condition necessary for health is maintained. Advice on feeding, with its obvious connection with health, can also be obtained from this source.

Causes of Condemnation

The following are the chief causes of condemnation and rejection: Tuberculosis, pleurisy, peritonitis, septic wounds, faulty castration, arthritis, nephritis, bruises, and skin lesions. It should be emphasised that, with the possible exception of tuberculosis, all are the results of defective management and are therefore preventable.

J. E. McIlwaine, in the October, 1935, issue of "The New Zealand Journal of Agriculture," wrote: "There is no doubt whatever that if greater attention is paid to the cardinal matters—improved housing, feeding, and improved conditions—the alarming mortality in young pigs would be reduced to reasonable proportions." H. M. Pierson states: "The more pig recording is extended the more definite has it become that management is the biggest factor in successful pig-keeping. . . . It is still unsatisfactory to find that the pig is the first animal to be neglected on the farm. At haymaking and holiday time the weights of many litters show a considerable decline."

What are the reasons for this? They might be failure to recognise the extent of loss and the value of housing and hygiene; overwork and lack of sufficient time to attend to pigs; or a method of pig farming not suited to the soil type and locality. Success in pig farming is usually ensured by one of the following conditions: A highly-suitable locality, with dry subsoil, sunny aspect, and abundant natural shelter; a plant big enough to employ one or more men the whole time; or the owner or one of his staff being keenly interested in pigs and able to take the time necessary to attend to them.

Extent of Losses in the Industry

For the year ended September 30, 1937, it was calculated that the loss to the industry through rejections and condemnations alone was £187,000. A further loss of £74,000 through inferior quality brought the total losses shown by freezing works returns to over £261,000. This takes no account of the losses which occur on the farm and the extent of which is now being investigated. These probably outweigh in magnitude the whole of the abovementioned losses, and, of course, many pigs which are rejected or condemned have recovered from ailments from which they have suffered on the farm.

This all points to the overwhelming importance of good husbandry, clean conditions, and good feeding in avoiding as much of this loss as possible.

An estimate based on records kept at the place of slaughter has been made of the monetary losses incurred during 1947 by the producer, the trade, and the State through disease and inferior quality of pigs. These figures have been compiled on much the same lines as a similar analysis of the 1937 figures.

Compared with 10 years earlier, the figures show that, though the total condemnations have fallen from 2.5 to 2.37 per cent., partial condemnations from 14.3 to 12.7 per cent., and unexportables from 12.9 to 10.1 per cent., the losses represented by these are higher because of the increase in value of meat. The total condemnation and rejection losses amounted to £130,000, and per 100 pigs were £19 18s. 6d., compared with £16 13s. 10d. 10 years earlier.

If the losses through inferior quality are disregarded, the producer's share of the disease losses has been reduced from £7 12s. 7d. to £6 17s. 11d. per 100 pigs. This represents the reduction of a "levy" of 1s. 6d. per pig to one of 1s. 4½d. Had pig meat prices remained stationary, the reduction shown would have been about 4d. The instructional levy has increased by the same amount over the period. There is, however, a net gain to the producer, as it is fair to assert that losses on farms are likely to have declined in something like the same proportions as those recorded at the works. There is as yet, however, no basis on which to estimate the extent of these losses. After completion of the survey now being carried out it will be possible to include an item covering direct losses on the farm.

As in the previous analysis, the trade loss in handling diseased pigs has not been included. Whether carcasses are partially or totally condemned or only rejected, there is an extra cost in inspection, handling, and disposal of the carcasses as compared with clean pigs. If this extra cost amounted to 2s. per pig affected (25.1 per cent.), it would total £16,200.

Disease Conditions

The following disease conditions are important in causing losses in carcasses at the works. They are also responsible for the major disease losses on the farm. The abbreviations are those used on the killing sheets.

T. or T.B.—Tuberculosis

Tuberculosis is a chronic contagious disease characterised by progressive emaciation. The symptoms, however, are as varied as the sites in which the lesions of the disease are found. Most pigs show no evidence of the disease during life, as they are killed before the emaciation stage is reached. In fact, at times T.B. seems to stimulate growth and well-being, as some of the fattest young pigs are seriously affected with the disease in its widespread or generalised form.

It is difficult to detect T.B. during life in pigs, but in some cases the glands under the jaw or ear are swollen enough to impede movement of the head. The glands may rupture externally and discharge thick, cheesy pus. Lung affection is usually indicated by a short, suppressed cough, later becoming more frequent, with retching and distressed breathing.

Abdominal affection may be indicated by a loose, hanging tail, an arched back, and the pig lying or crouching in a corner on his own and resisting movement. However, few pigs live long enough to show definite symptoms and those they do show can be confused with half a dozen other troubles.

Boars and sows should be watched carefully for symptoms such as coughing, wasting, swollen glands, and abscesses on the udder, as they may easily spread infection to the herd.

Fifteen per cent. of all pigs killed in New Zealand are affected with tuberculosis; 1.5 per cent. are so seriously affected that they have to be wholly condemned for generalised T.B., and 13.5 per cent. are partly condemned. The majority of these are headless pigs—those with the gland below the jaw (the submaxillary) affected. The affection may be a yellowish spot about the size of a pin's head, or the whole gland may be swollen to the size of a potato. These headless pigs are exportable subject to a rigorous check inspection of every accessible gland or organ.

Generally 99 per cent. of affected pigs have head and throat lesions; the bowels are affected in 37 per cent., of cases, liver 31 per cent., stomach 17 per cent., spleen 16 per cent., kidney 1 per cent., and backbone .7 per cent. or lower. Every pig is judged on its merits, all organs being examined; by a system of tags and pins the final inspector can weigh up all the evidence.

On reaching Britain these carcasses are subjected to a percentage examination as rigorous as in New Zealand, and it says a great deal for Dominion methods that few, if any, carcasses are condemned in Britain. The usual practice of freezing companies is to deduct 10 per cent. of the carcass weight for a condemned head and pay for this weight, say, 10 to 20lb., at a reduced rate.

The commonest source of infection with tuberculosis is raw skimmed milk from tuberculous cows, but pastures contaminated by T.B. cows or their discharges and old, muddy, infected pens may be responsible. Tuberculous sows may be the cause of whole litters not reaching baconer weight. In manure on pastures the tubercle bacillus may live about 8 months, but sunlight destroys it in a few hours; hence the need to keep pig pens and their surroundings as clean as possible. Dirt and mud afford excellent protection from sunlight for not only the tubercle bacillus but dozens of other bacteria and organisms harmful to pigs.

Detection of every possible infectious cow in the herd is not easy without the use of the tuberculin test. Infections from this source could be lessened, however, if farmers familiarised themselves with the suspicious signs and reported promptly to their inspector of stock any cows showing these. They are:—

1. Tuberculosis of the lungs: Loss of condition and chronic cough, the cough being manifested after exertion.
2. Tuberculosis of the throat glands: Peculiar carriage of head, abnormal "roar" in breathing, or swelling at throat.
3. Swelling of any superficial lymphatic gland, the three chief being below ear, front of shoulder, and fold of flank.
4. Tuberculous mastitis: Gradual increase in size and hardness of one quarter of the udder without previous acute inflammatory stage of ordinary mastitis.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in November as follows:—

Auckland—1YA, on November 22, at 12.35 p.m., a topical discussion arranged by H. E. Clark, Supervisor, Auckland District Pig Council.

Wellington—2YA, on November 15, at 7.13 p.m., "Selection of Breeding Stock," C. M. Bailey, Supervisor, Taranaki District Pig Council.

CAUSES OF PIG CARCASS CONDEMNATIONS

[*National Publicity Studios photo.*

Every carcass is carefully inspected by skilled meat inspectors employed by the Department of Agriculture. This inspector is examining glands in the fore end of the carcass.

P. or Pl.—Pleurisy

Pleurisy is an inflammation of the smooth, glistening covering of the lungs and chest wall, and is usually associated with pneumonia. Nine per cent. of all pigs reaching the works have at one time during their lives suffered from pleurisy to such an extent that they have to be trimmed to be suitable for export; despite all careful trimming, a considerable number of these have to be rejected.

Acute or active pleurisy, in which the animal is fevered, brings complete condemnation. Any fevered carcass, if passed for human consumption, might give rise to food poisoning. In the majority of cases, however, the pleura is thickened and the lungs adhere to the chest wall, indicating that the pig has had an attack and has recovered. These adhesions are carefully trimmed up, wiped, and, if possible, removed. If, however, the pleura has to be "stripped" or is damaged or thickened, the forequarter must be rejected. If pus is present, the carcass is condemned as a protection from food poisoning.

Reject price is only part of the loss, as any pig which has had a setback in its growth because of pleurisy is miserable and coughing for some time and requires more food to bring it to market weight than litter mates which escaped infection.

The high incidence of pleurisy is caused by the pig's vitality being lowered and consequent invasion by the *Pasteurella* organism. This is a common bacteria of the healthy pig's lung, but when resistance is lowered it makes good its opportunity and seizes all the space it can, growing out of all proportion to its normal numbers. The same thing happens to humans when they have coughs and colds.

Unbalanced rations, poor or dirty housing, and muddy, ill-drained runs with no shelter from rain, wind, or sun all lower resistance, and invite high losses from unthrifty pigs, pneumonia, and pleurisy.

Pigs seeking shade under a draughty hedge may easily contract a chill which can develop into pleurisy. As much pleurisy occurs during summer, this is probably an important cause. Close-growing shelter which prevents ground draughts is essential.

Pe., Pr., or Per.—Peritonitis

Peritonitis is inflammation of the peritoneum or smooth, glistening membrane surrounding and enclosing all the organs and walls of the abdominal cavity. Thickening and adhesions are again present and the membrane, with all the fat immediately under it, has to be stripped out.

Infection from faulty castration, travelling back up the stump of the cord, the covering of which is a continuation of the peritoneum, seems to be one of the major causes of peritonitis. Internal parasites migrating through the walls of the intestine and boring into the liver and kidney carry putrefactive and pus-forming bacteria from the intestines which may give rise to peritonitis of varying severity, depending on the mass of infection and the health of the pig.

Lowered resistance, which leads to pleurisy caused by *Pasteurella* organisms, can also cause the suipestifer bacteria, found in the intestines of healthy pigs, to grow out of bounds; this results in enteritis or inflammation of the intestine, with scouring and loss of condition or death. Again the resulting peritonitis is not the greatest loss; it is the number of pigs that remain unthrifty, if they live, and use extra feed and time to reach baconer and porker weights.

Unbalanced rations, parasites, faulty castration, contaminated surroundings, and bought-in pigs carrying suipestifer and contaminating the troughs, water supply, and runs all help to upset the delicate balance between health and lowered resistance.

N. or Neph.—Nephritis

Nephritis is inflammation of the kidney. If it is active and the pig fevered, the carcass is condemned. Usually the kidneys are pitted or scarred by a previous attack or by the migrations of internal parasites. The kidneys are removed and condemned, and if pus is present, the whole carcass must be condemned. Food poisoning has been traced to the consumption of meat from an animal with a kidney abscess.

Suipestifer is the common organism found. Parasites in young porkers leave their mark on the kidneys. Feeding and housing must be attended to; foul skim pipes, decayed town offal, and draughty, dirty quarters must all be eliminated.

The kidneys of pigs form a valuable export, but only about 60 per cent. are exportable, the rest being condemned with the carcass in cases of T.B., etc., removed for nephritis scars, or so affected with hydatids that they must be condemned.

Ar. or Arth.—Arthritis

Arthritis is inflammation of a joint which is usually full of discoloured synovia (joint-oil) and swollen. More hams are condemned or partly condemned for this condition than for anything else. Occasionally the pig is in poor condition, with the joints of all four legs affected; then it is wholly condemned, the condition being called polyarthritis.

Dirty navel cords in young pigs often lead to infection of the joints, which swell and may become septic and burst. A safe plan is to clean the cords with iodine if conditions are muddy or if this trouble has occurred on the farm with previous litters.

The organism *Erysipelothrix rhusiopathiae*, the causal organism of swine erysipelas, fortunately, for some as yet unknown reason, does not give rise in New Zealand to many outbreaks of the acute type, with diamond-shaped red or purple patches on the skin, fever, lameness, heart trouble, or death; but it does cause much arthritis. These cases present swollen and inflamed joints, some of which may clear up but a great many of which remain to cause condemnation of the affected leg or carcass in the works.

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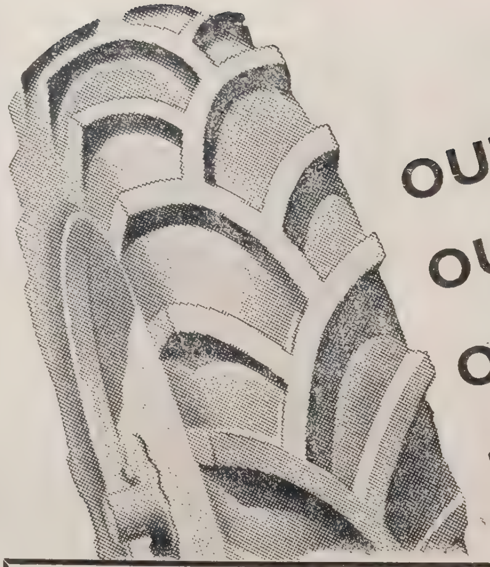

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Well-fed, well-housed pigs with good runs can recover quite well from an attack and it does not seem to worry them unduly, but the pig with low powers of resistance falls an easy victim and becomes permanently crippled.

The *Erysipelothrix rhusiopathiae* can live and multiply in a warm or temperate climate and in muddy, wet yards, and is very hard to eliminate. In fact, if the soil is contaminated badly, the best plan is to shift the pig yards, as the organism can build up to the stage of causing serious epidemics with severe losses. Britain and America, with old-established pig pens and pig lots, have to use vaccines and serums against swine erysipelas as a regular part of pig rearing; New Zealand should profit by their experience and take no unnecessary risks with this organism.

Bruising, spraining, mineral and vitamin deficiencies, and rickets may also cause swollen joints.

Salmonella Suipestifer

Infection by *Salmonella suipestifer* (or, as it is usually known today, *Salmonella cholerae suis*) is an important factor in the production of the three previously-named conditions. It is an organism and does not appear on the killing sheets as a cause of rejection, but it produces conditions which result in rejection and it is also one of the chief causes of mortality in young pigs. The symptoms and control of *Salmonella suipestifer* will be dealt with in a later article.

A. or Ab.—Abscess

An abscess is a closed cavity containing pus, which may be found in any part of the carcass. The whole pig may have to be condemned or rejected, according to the situation and degree of infection. If the carcass becomes contaminated with pus while being dressed, it must be condemned, as the risk of food poisoning from pus-producing bacteria is very high. Some of the worst outbreaks in the history of food poisoning have been caused by pus-contaminated meat or meat products.

Dirt in cuts, scratches, or irritations resulting from lice, staggy pigs, barbed wire, protruding nails, broken glass, loose sheets of iron, or old farm machinery is a likely source of infection.

Any infected and neglected cut or tear, however small, can give rise to an abscess if not treated. Keep a supply of a good disinfectant on hand, open up all abscesses, and allow them to drain and heal. More important, of course, is to avoid the causes of cuts, scratches, or irritation. Keep the pigs free from lice, clear the pens and runs of dangerous sharp obstructions, and do not use the pig runs as a scrap heap for worn-out trucks, discarded discs, or old wire and iron.

F.C.—Faulty Castration

A swelling at the site of the operation on the ends of the spermatic cords is usually evidence of faulty castration. Some pigs have large swellings which may discharge pus. The infection can spread to the abdominal cavity and give rise to varying degrees of peritonitis, or the scar tissue may be the only seat of abscess formation.

The swollen spermatic cords must be cut out, thus spoiling the hams for freezing, apart from the fact that when conditions return to normal Britain will not accept hams that are badly cut into. If abscess formation is present, the carcass may have to be condemned or partly condemned, according to the severity and spread through the body.

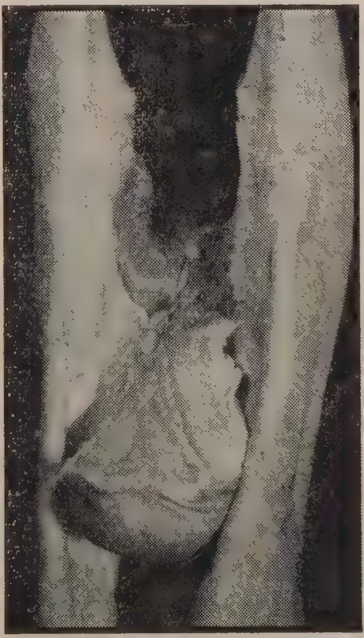
Castrate pigs when they are 3 or 4 weeks old, and try to select good weather and dry surroundings so that mud or dirty rain-water draining down the pig's back does not enter the wounds. Pigs castrated when about a month old are not badly set back.

The site of the incision should be washed with antiseptic and soap, instruments should be clean and kept clean, and the incision made low so that no pocket is left and drainage is free, as pockets provide an ideal site for bacteria to grow and multiply, and give rise to abscesses, peritonitis, or schirrous cord. The incision should be about 1 to 1½in. long. Do not use harsh corrosive antiseptics, as they do more harm than good. There are plenty of mild but efficient antiseptics for this job and they are worth a little extra in cost; acriflavine is as good as any.

Sell as light porkers all pigs with retained testicle or testicles. The reason for this is given in the following paragraph.

S.O.—Sexual Odour

Under the heading "sexual odour" are listed pigs from which only one testicle has been removed and those with both testicles retained in the abdominal cavity, thus leaving the pig with all the characteristics of the boar. If the pig is not killed at the light porker stage, the odour of the boar condemns the pig when it comes to the baconer class. No matter how bacon from a "rig" pig is treated, boiling or frying will always bring out the odour.



A large abscess which has developed as the result of faulty castration. The resultant excision causes the spoiling of hams even with small abscesses which are not sufficiently bad to warrant condemnation.

Again feed is wasted, and a rig pig causes a lot of damage in a truck of pigs by bites and bruises. At the light porker stage the odour is not strong enough to condemn the carcass and the rig has not fully developed his fighting propensities.

Cull boars, if castrated, fattened, and sent in as choppers, should be allowed at least 2 months from the time of the operation for the odour to be eliminated; otherwise they are likely to be condemned. Cull boars, treated properly, provide a useful source of sausage meat.

Py.—Pyaemia

The term pyaemia is applied when pus-producing organisms invade the bloodstream from some suppurating focus and are carried all over the body, giving rise to multiple abscesses in the muscles, kidneys, liver, lungs, and brain. All carcasses affected must be condemned.

Septic wounds, abscesses, parasites, faulty castration, septic pleurisy, and such substances as broken glass in the food all help to put pus-producing bacteria into the bloodstream, emphasising the need to dress all cuts with antiseptic, castrate cleanly, and prevent parasites, pleurisy, and peritonitis. Watch for dangerous foreign matter in the feed, particularly in hotel or restaurant garbage.

S.D. or D.—Skin Disease

Any disease or skin defect which damages the skin is listed as "skin disease." As the meat of the pig is sold with the skin on, the pelt must be clean and free from blemish. However good the body type, the eye of meat, the backfat, and other factors may be, any skin defect, especially in porkers, necessitates the skinning of the affected area and the automatic rejection or degrading of the carcass from exportable to sausage or smallgoods meat—a serious drop in value. Baconers after being singed and scraped can be peeled to a minor degree and small blemishes camouflaged away.

Mange (rarely), lice, sunburn, and urticaria or food rashes are the chief offenders.

Mange is a notifiable disease under the Stock Act, and the local veterinarian or Stock Inspector should be notified if it is suspected. Intense irritation, pigs losing condition as they constantly rub and scratch and have no peace, and crusts or scabs behind the ears and shoulders are all symptoms of mange. The parasite cannot be seen with the naked eye; skin scrapings must be examined under a microscope to confirm suspicion. However, this disease is rare and mild infestations will respond to the treatment advised for lice.

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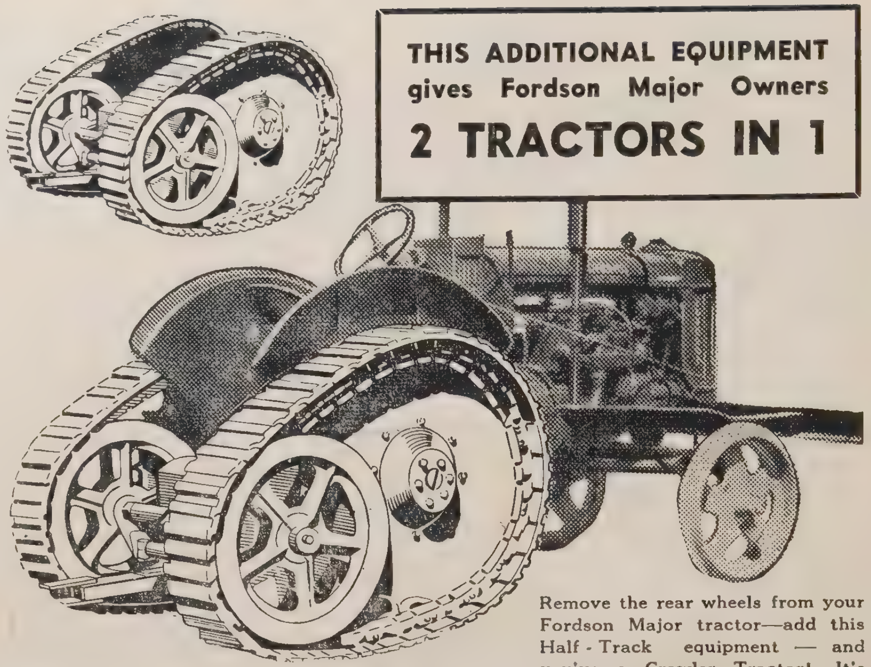

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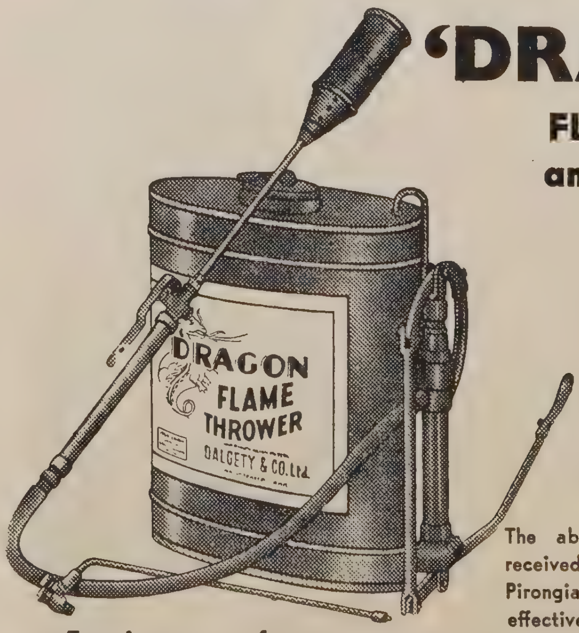

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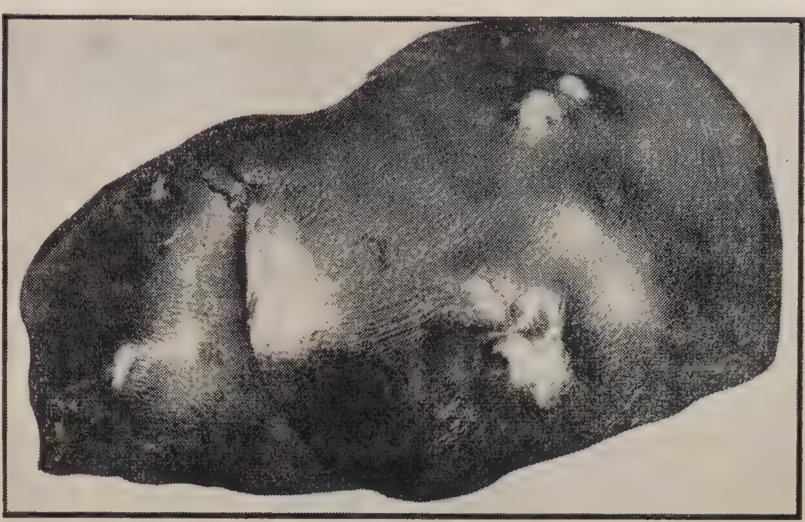

Hydatid cysts in the liver of a pig.

Four or five inches of waste motor oil floating on the surface of a dip or applied by spray or hand every 10 days will soon destroy lice. A sack soaked in motor oil and tied around a post which is accessible to the pigs provides scratch and cure in one.

Sunburn is serious in white-skinned pigs if no shelter is provided in midsummer. The skin cracks, scabs form, and if subjected to frequent attacks, the skin becomes horny and warty. Dressing with waste engine oil and lampblack will help considerably, but shelter is the main essential. A mud-wallow may protect the pigs from the sun, but infection picked up in old wallows may cause abscesses or, worse still, *Spirochaetal necrosis,* which will be described under "wounds."

Urticaria resembles a nettle rash in which the tender parts of the skin, belly, behind the ears, and crutch are reddened and inflamed. In the main this is caused by digestive upsets and unsuitable rations.

Constipation or scouring must be watched for as early indications of faulty diet. A few doses of Epsom-salt or liquid paraffin may relieve the constipation, but the diet should be changed as well and a run-off on pasture allowed. If scouring is present, check up on the troughs to see that they are clean and sweet. Dose the pigs with castor oil, reduce the feed for a day or two, and provide access to good, clean grass.

Decayed town garbage must be eliminated and dirty skim or whey pipes cleaned out or renewed. Sudden changes of feed, for example, milk alternately sour and fresh, may precipitate digestive upsets.

Emac. or E.—Emaciation

A pig in very poor condition with no fat on it and even the muscles wasted is described as emaciated. Natural thinness or leanness because of lack of sufficient nourishment must not be confused with emaciation, the usual cause of which is some form of chronic disease. Thin carcasses are passed, but emaciated pigs are condemned.

W. or M.—Wet or Milky

Cull sows sent into the works as choppers when still in milk have the mammary glands removed and are rejected. The cure is obviously to dry them off before sending them to the works. They will be in better condition and a better economic proposition.

W.—Wounds

Scar tissue may cause rejection of part of a carcass because of unsightly puckering and contraction of the skin in healing. Septic wounds condemn part or whole of a carcass, depending on the site and severity. Abscess formation may be present.

Scratches may become infected with *Spirochaetes,* organisms found in wet, muddy pens and runs. These organisms cause ulcerating skin lesions of varying size and severity, according to the length of time they have been neglected. The ulcer, called *Spirochaetal necrosis,* spreads out like ringworm, causing a black slimy mess raised slightly at its borders and oozing evil-smelling pus. Pigs arrive at the works with these skin sores up to 12in. in dimeter. If such sores are thoroughly cleaned with warm soap and water and dusted with tartar emetic at weekly intervals, they will clean up satisfactorily. Extreme care should be exercised in the use of tartar emetic, as it is very poisonous and must not be allowed to contaminate water or feed.

Sulphanilamide powder should be used if the ulcer is in a position where the powder is liable to get in the pig's mouth.

Pointed objects, staggy pigs, dog bites, etc., are the causes of cuts, which become infected from dirty yards. Dress all cuts and scratches and watch out for ulcers. Above all, eliminate the causes of scratches and wounds before trouble starts.

B.—Bruises

Bruises, if at all extensive, must be thoroughly trimmed out and explored. A small skin blemish may lead to a pocket of congealed blood and torn muscles the size of a saucer. This, of course, disfigures the carcass, and condemns the part. Bruising may be severe enough to justify condemning the whole carcass if the animal is fevered and in a bad toxic condition.

The cause is obviously rough handling in trucking—kicking and hitting with the handiest piece of wood about the place. A piece of wet canvas about 3ft. long and a foot wide, folded up to about 3in. wide, will act as a good coaxer; it makes a lot of noise, scares the pig along, and does little damage.

Overcrowding in narrow loading races or pens leads to pigs going down and being severely bruised by other pigs scrambling over them.

If pigs are handled well at the farm end, and returns still come back showing bruising, check up and see that old choppers or stags were not loaded in with the baconers or porkers. The freezing companies and bacon factories will be glad to help prevent bruising; it is to their advantage, too. The carrier may not know how to handle pigs or may be in a hurry, but they are the farmer's pigs and it is his cheque that is affected.

Hydatids

Hydatid cysts, which are the cystic or intermediate stage of the tapeworm of the dog, are common in the livers and other internal organs of pigs in New Zealand, causing condemnations of almost 50 per cent. of pig livers in some districts. If farmers effectively used the arecoline tablets which they pay for when registering their dogs, practically the whole of this waste could be eliminated.

Def.—Deformities

Congenital deformities such as curvature of the spine and rickets come under the heading of deformities. These carcasses are rejected. Only the bones are misshapen, and the meat is perfectly fit for food if the pig is in good condition otherwise. Congenital deformities cannot be foreseen or cured, but the pig should be eliminated as soon as it is noticed.

Rickets is a nutritional disease of young pigs characterised by poor bone formation, twisted limbs, swollen joints, knobby ribs, curved spine, and poor teeth. Vitamin D provided in green food, full milk, and cod-liver oil, in conjunction with sunlight and bone meal or bone flour, will prevent young pigs becoming rickety.

Rickety pigs are likely to fall victims of all the diseases pigs can have and are not necessarily all "bad doers." Some quite good-looking pigs may be coarse in the joints, showing that they have a touch of rickets caused by unbalanced diet or lack of sun, especially if they are housed or being topped up. Cod-liver oil is invaluable in such cases in winter and spring if the pigs must be housed, but 2 hours' sunshine daily in a good paddock is a cheap preventive.

CAUSES OF PIG CARCASS CONDEMNATIONS . . .

M.—Melanosis

Melanin, a dark-brown pigment normally present in hair, skin, eyes, hoofs, etc., may at times be secreted in excess by the body and be deposited in patches in the subcutaneous fat of the belly (seedy cut), or it may invade the bloodstream and multiply in the form of tumours in any part of the body. Some breeds of pigs are more prone to melanosis than others, and it may be a dominant feature in the line being bred. Seedy cut lowers the value of the bacon affected, and, if it is very bad, the parts may have to be trimmed off. When it is spread over the body in tumour form the carcass is condemned.

Control of Pig Diseases

The endeavour to maintain health in pigs by the employment of sound methods of feeding and management under conditions which vary from farm to farm is a most important aspect of disease control. The surest way to control disease in pigs is to pay attention to the following: Regularity in feeding, variety in the diet, the provision of roughage or green-feed if need be, avoidance of over-crowding, and avoiding over-feeding, constipation, or scouring; sanitation, drainage, and hygiene; prevention of extremes of temperature during summer (hot days followed by cold nights) by provision of shade and draught-proof housing; oiling to prevent lice and mange; prevention of checks in young growing pigs; and the general maintenance of growth and bloom in pigs. This aspect of the fight against disease in pigs cannot be too strongly stressed under New Zealand farm conditions, as there is a tendency to production with a very limited variety in the nature of the general food supply for all classes of pigs and with no consideration of the varying requirements of the pigs at different stages of growth and development.

Another aspect in controlling disease in pigs is careful observation and the immediate treatment of pigs that are off colour. Isolation of the sick pig in the early stages to prevent other in-contact pigs in the same sty contracting the infection is the first thing to be done. Isolation is not an empty term; it requires to be applied and applied promptly and with judgment in many cases.

The separation of the healthy from the sick, the isolation of newly-purchased animals until it is clear that disease is not being introduced, suitable nursing and special treatment of sick animals, and the slaughtering of all chronically-sick pigs are all valuable measures which can be put into operation without any specialised knowledge of the various diseases to which pigs are subject.

Numerous farms have chronically-sick pigs. They are a direct menace and are frequently reservoirs of disease germs; in many cases they have been affected with disease, have partially recovered, and remain chronic carriers and spreaders of disease. They should be slaughtered.

All pigs killed off because of disease should be promptly disposed of by deep burial or burning. The intact disposal of a carcass without spilling blood, unless a special post-mortem examination is carefully carried out, will prevent disease spread. If a post-mortem examination is held, all blood, offal, and carcass should be cleaned up, buried, or burnt.

Most farmers have healthy pigs because they pay attention to these aspects of disease prevention. Some have outbreaks of disease in spite of their care. This will happen; but there may be some weakness in their management of which they are unaware. Others take little care and get into difficulties.

Insurance schemes and Government compensation for condemned stock are only crutches for the incompetent, but, unfortunately, losses creep up on even the best farmers if simple precautions are neglected. The advice of officers of the Livestock Division of the Department of Agriculture is freely available on all aspects of pig feeding and disease. Bad killing sheets are expensive and disheartening and a loss to everyone concerned.

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METEOROLOGICAL RECORDS FOR AUGUST

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	51.4	+ 0.8	65.5	33.5	5.07	12		2.33	6	129.5
Auckland	160	52.6	+ 0.5	62.6	42.3	2.99	15	— 1.64	0.85	7	117.5
Tauranga	10	50.6	+ 1.0	65.7	32.1	2.50	9	— 2.24	1.59	7	142.1
Ruakura	131	49.0	+ 0.6	63.9	28.1	1.75	16	— 2.26	0.33	26	115.3
Rotorua	980	47.5	+ 1.2	64.0	29.0	1.50	12	— 3.67	0.50	7	127.2
Gisborne	12	50.6	+ 1.1	66.2	33.2	5.82	16	+ 2.11	1.84	7	163.7
New Plymouth ..	160	50.0	+ 0.4	59.3	34.2	6.05	16	+ 0.44	1.01	13, 19	136.6
Napier	5	51.0	+ 2.1	66.6	32.7	5.39	14	+ 2.40	1.41	2	149.3
Taihape	2157	43.4	+ 0.5	55.3	28.2	2.93	17	+ 0.22	0.61	2	
Wanganui	72	49.4	+ 0.9	60.8	34.5	3.90	14	+ 1.13	0.70	2	136.2
Palmerston North	110	48.0	+ 0.4	59.0	29.0	3.21	17	— 0.14	0.72	24	118.7
Waingawa	350	46.9	+ 1.2	62.5	26.0	3.33	16	— 0.93	1.29	8	143.8
Wellington	415	47.4	+ 0.2	56.3	34.8	4.42	15	+ 0.00	1.69	17	147.5
Nelson	24	47.0	+ 0.0	61.6	32.4	1.71	5	— 1.62	0.92	17	201.9
Blenheim	12	47.1	+ 0.2	64.2	29.8	1.03	8	— 1.26	0.66	17	191.6
Hokitika	12	44.5	— 0.5	60.6	30.3	6.25	18	— 3.05	2.38	16	148.9
Hanmer Springs ..	1225	40.6	— 0.8	61.2	20.0	5.72	12	+ 2.24	2.24	8	157.5
Christchurch ..	22	43.6	— 0.6	66.7	25.1	1.09	12	— 0.96	0.53	7	182.3
Ashburton	323	44.0	+ 0.9	67.2	24.2	2.09	10	— 0.14	1.02	5	172.4
Timaru	56	43.2	— 0.6	67.5	24.8	1.32	9	— 0.07	0.52	5	173.0
Alexandra	520	41.2	+ 0.0	62.8	23.0	0.79	7	+ 0.14	0.46	23	166.4
Taieri	80	42.9	— 0.8	65.0	21.8	1.26	11	— 0.69	0.66	23	
Invercargill ..	32	43.1	— 0.3	63.0	26.0	4.47	24	+ 1.44	0.70	4	141.7

BOOK REVIEW

"Sheep and Sheepmen of Canterbury, 1850-1914": Sheila Crawford

MISS CRAWFORD'S book, published with the aid of the State Literary Fund, is an entertaining account of the development of Canterbury by sheep farmers on small and large stations, whether in the backblocks or close to towns. Much of the material has been obtained from published sources, but some of it has not been accessible to the public. It is unfortunate that there was not more original material available to the author, as this has forced her to use sources fairly well known to students of early farming.

To attempt to write a factual and yet readable narrative of an industry moulded by factors which have either to be mentioned briefly or explained in detail is not a simple task. Because of this, the author was faced with a problem of some magnitude and her treatment indicates that she found difficulty in discussing in an easy manner the factors which influenced Canterbury sheep farming. The book aims at describing the industry from the days of the first white settlers to 1914. To break up such a wide subject the writer has used certain headings and then tried to write within these headings. Some division of topics is necessary in any book, but in making such a division the author, on a few occasions, has divorced effects from their causes. Though this is regrettable, it has not detracted seriously from the attempt to portray on a broad canvas a picture of early Canterbury sheep farming.

Despite the difficulties inherent in trying to describe the growth of farming over a lengthy period in a book of moderate proportions, Miss Crawford has written an excellent sketch of the problems the first farmers encountered in planting in New Zealand a replica of the rural community of England. For many who have but a slight knowledge of the experiences of the first pastoralists this book will prove of value.

—*A.A.R.*

Simpson and Williams Ltd., Christchurch, New Zealand. 10s.

◆

SWARM CONTROL AND UNITING OF COLONIES

Seasonal Notes for the Domestic Beekeeper

BEES require considerable attention during the next 2 months, and to obtain a good crop the beekeeper must ensure that his hives build up to maximum strength before the commencement of the main honey flow. Information which will assist amateur beekeepers with problems of swarming control and the management of populous colonies is given in this article by R. Goddard, Apiary Instructor, Department of Agriculture, Tauranga.

ALTHOUGH swarming of a colony is governed by the desire of the bees to multiply, several other factors tend to encourage this natural instinct. During the brood-rearing season the colony eventually reaches the stage where there are far too many young bees in the brood nest, the queen can find no empty cells in which to deposit eggs, and older bees are cramped for space to store newly-gathered nectar. This over-crowded condition of the hive causes discontent and to relieve congestion elaborate preparations are made for swarming.

Signs of Swarming

The first indication the beekeeper has that swarming is imminent is generally the presence of drones in large numbers and the rearing of queen cells. Fortunately, however, colonies rarely swarm before these newly-formed queen cells have reached maturity, though long periods of unsettled weather occasionally accelerate the rate of swarming in an apiary. Signs of reduced activity at the hive entrance are sometimes quite noticeable before the swarm issues forth, usually about noon on a fine, warm day.

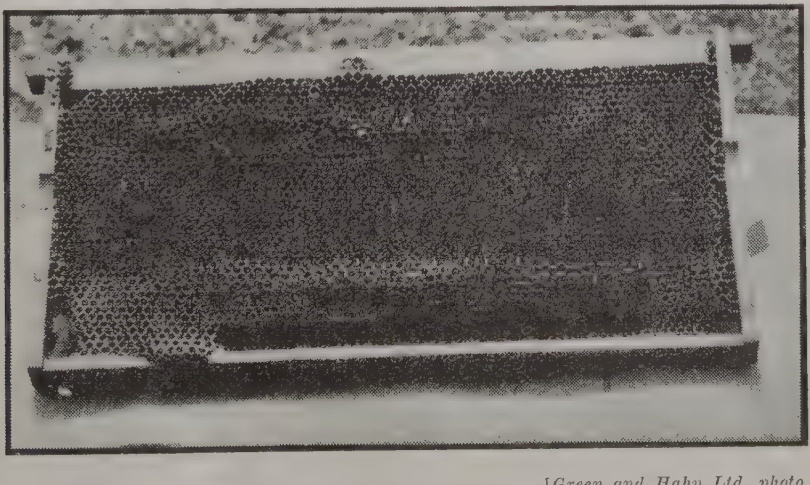
Prevention of Swarming

From the time colonies first show signs of swarming they should be examined critically every 9 or 10 days, and, though the domestic beekeeper may find that swarming can be prevented by the regular destruction of queen cells, care should be taken to ensure that the bees are really intent on swarming and not merely preparing to supersede an old and failing queen. Systematic destruction of queen cells, though considered an effective method in the prevention of swarming, does little, if anything, to relieve the general condition of the colony and the desire of the bees to swarm. Besides destroying queen cells, the beekeeper should attend automatically to the following points:—

1. If the colony is crowded, add an extra super.
2. Remove and replace excessive drone comb with worker comb.
3. Ensure that the colony has sufficient ventilation at the hive entrance.
4. Provide the queen with ample room to lay in good worker comb.

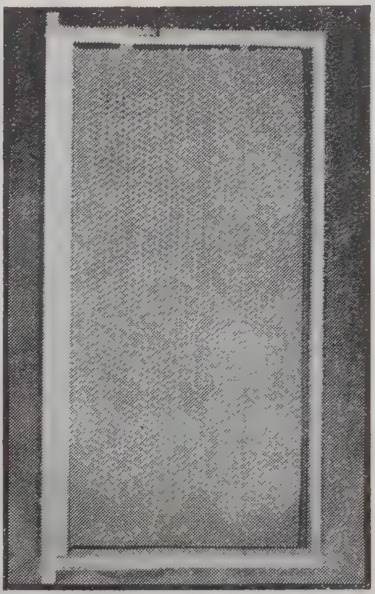
Demaree System of Swarm Control

The Demaree system, which entails the removal of sealed brood from the brood chamber to an upper story, with the use of comb foundation to fill the empty spaces left in the brood nest and the confining of the queen to the lower stories by means of a queen excluder, is perhaps the most widely used method of swarm control today.



[Green and Hahn Ltd. photo.

Badly-built comb caused by faulty wiring and sagging of foundation induces the building of drone comb.



Use of full sheets of comb foundation results in good worker combs suitable for brood rearing and with a minimum of drones.

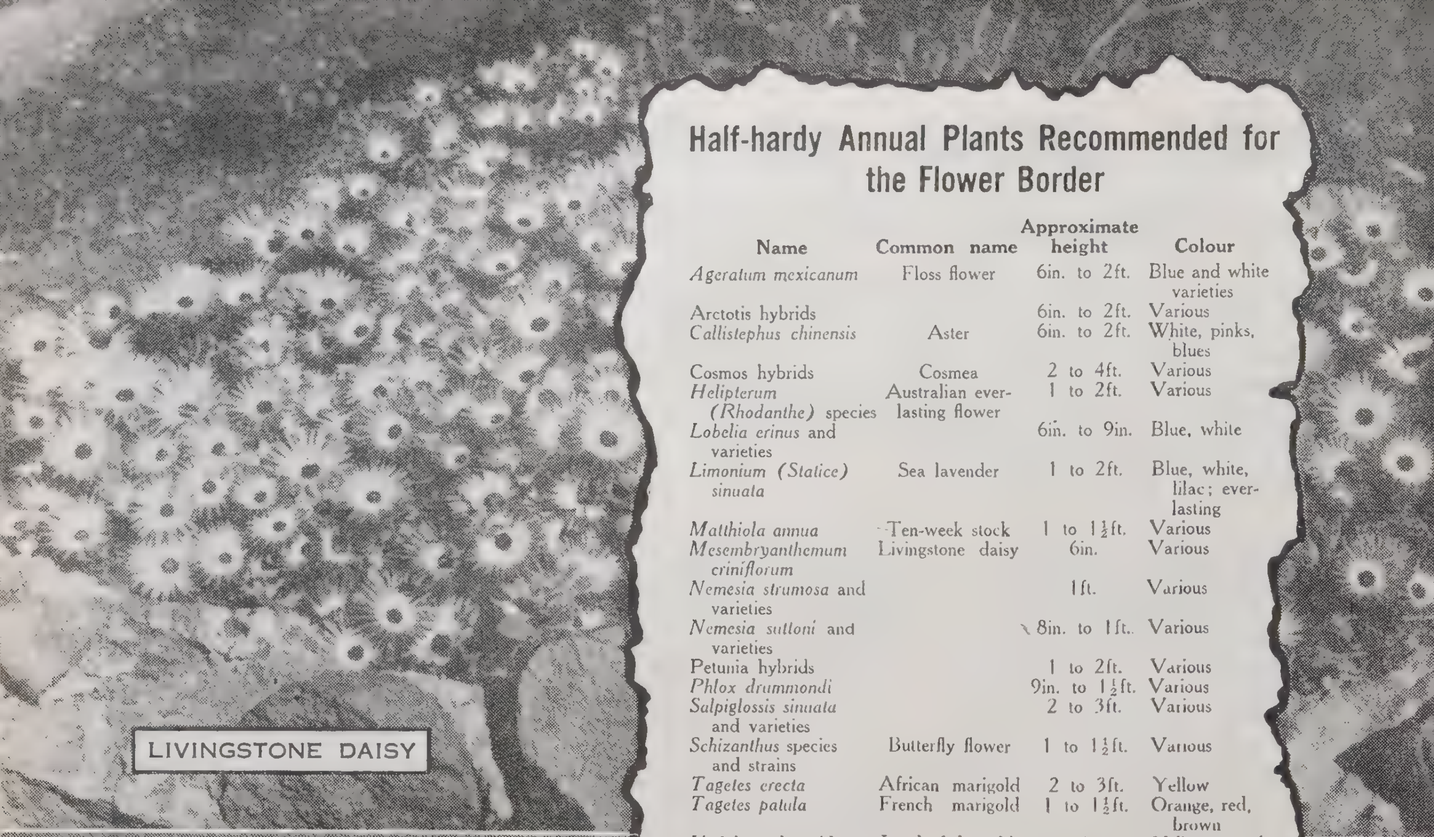
All the main principles of swarm control are embodied in the one operation. The queen is given additional laying room and the removal of surplus brood to the top story of the hive attracts the nurse bees, thus relieving congestion in the brood nest. It is necessary to examine the brood on the top story in 8 or 9 days in order to destroy any queen cells which may have been started.

It is realised that bees at times are quite unpredictable, but if the domestic beekeeper is alert and diligently carries out the recognised swarm control procedure, little difficulty should be experienced in this extremely important aspect of beekeeping.

Uniting Colonies

To produce a maximum crop it is essential that hives are full of brood and bees at this time of the year. As weak colonies will not build up in sufficient time to gather any surplus honey, it is considered desirable to unite them to other colonies.

This simple operation, which entails the placing of two hives together, one on top of the other with a sheet of newspaper between, is best carried out in the evening. In extremely hot weather a number of small holes should be pricked in the newspaper to prevent suffocation of the bees on top. If both hives are queen-right and it is desired to save the better queen, it is advisable, as an added precaution, to destroy the queen not required.


LIVINGSTONE DAISY

Half-hardy Annual Plants Recommended for the Flower Border

Name	Common name	Approximate height	Colour
Ageratum mexicanum	Floss flower	6in. to 2ft.	Blue and white varieties
Arctotis hybrids		6in. to 2ft.	Various
Callistephus chinensis	Aster	6in. to 2ft.	White, pinks, blues
Cosmos hybrids	Cosmea	2 to 4ft.	Various
Helipterum (Rhodanthe) species	Australian everlasting flower	1 to 2ft.	Various
Lobelia erinus and varieties		6in. to 9in.	Blue, white
Limonium (Statice) sinuata	Sea lavender	1 to 2ft.	Blue, white, lilac; everlasting
Matthiola annua	Ten-week stock	1 to 1½ft.	Various
Mesembryanthemum criniflorum	Livingstone daisy	6in.	Various
Nemesia strumosa and varieties		1ft.	Various
Nemesia suttoni and varieties		8in. to 1ft.	Various
Petunia hybrids		1 to 2ft.	Various
Phlox drummondi		9in. to 1½ft.	Various
Salpiglossis sinuata and varieties		2 to 3ft.	Various
Schizanthus species and strains	Butterfly flower	1 to 1½ft.	Various
Tagetes erecta	African marigold	2 to 3ft.	Yellow
Tagetes patula	French marigold	1 to 1½ft.	Orange, red, brown
Ursinia anthemoides	Jewel of the veldt	1ft.	Yellow, purple
Ursinia pulchra		1 to 2ft.	Yellow, brown
Venidium fastuosum		1½ to 2½ft.	Orange, purplish black
Zinnia elegans		1 to 2½ft.	Various

—*H. P. THOMAS, Horticultural Inspector, Department of Agriculture, Palmerston North.*

Photographs by Douglas Elliott.

PETUNIA

AFRICAN MARIGOLD

Planting out Annuals and Bedding Plants for Summer and Autumn Flowers

DURING November the planting out of annuals and bedding plants intended to provide displays of colour in the flower garden throughout summer and autumn should be proceeded with at every favourable opportunity. In last month's "Journal" M. J. Barnett, Director of Reserves to the Christchurch City Council, dealt with the preparation of bedding schemes. This article details precautions which should be taken to ensure success in planting.

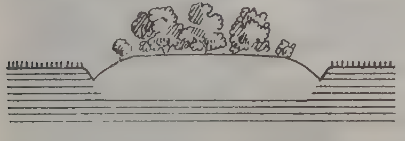
[Douglas Elliott photo.

Kalmia latifolia, the calico bush or American laurel, is one of the most beautiful of evergreen shrubs. It belongs to the order *Ericaceae,* the natural order of plants that includes rhododendrons, azaleas, and heaths, and grows best in a deep, well-drained soil similar to that recommended for rhododendrons. It dislikes lime and wood ash and will not tolerate a draughty situation or one exposed to cold winds. The bushes grow naturally into a good shape and require little, if any, pruning. The leaves are glossy green and the beautiful soft pink flowers are borne in early summer.

BEDS and borders should have already been dug over; the soil should now be broken down to an even tilth and the surface made even with a border fork and rake. If the soil tends to be loose in texture, it should be heeled over—that is, tramped down with the heels of the feet—to make it sufficiently firm for the roots to be embedded securely when planting is carried out. Should the soil be dry immediately before the time of planting, it should receive a good soaking with water and be left for some hours to allow the surface to dry sufficiently so that it is possible to work it without its being sticky. On the other hand, if heavy soils are inclined to be wet or sticky, planting should be delayed until the surface has become drier. However, if under such circumstances conditions do not improve and it is essential to proceed with planting, 8in. x 1in. planks laid on the surface will prevent the feet sinking into the wet soil. By starting from the centre row of the bed and working outward to the edges, it is simple to shift the planks after each row is planted.

Cutting the Edges

The edges or margins of beds or borders should be clearly defined and as nearly accurate as it is possible to get them. The effect of a bed of flowers may be spoilt by badly-defined and irregular edges. During digging operations, and again when the final levelling is being carried out, the soil tends to be worked out close to and sometimes over the edge and on to the lawn or pathway. Particularly where a lawn forms the margins of the beds, the soil should be thrown back from the grass edge neatly and evenly with a spade and the edging firmed with the back of a rake.

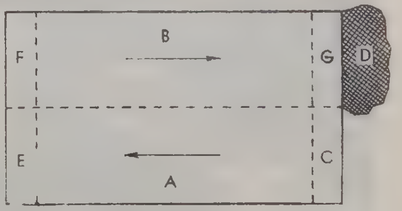


The grass edge, which should have been trimmed with the edging shears before the bed was dug, should also be trued up with the edging knife. There are two methods of shaping the grass edge—cutting it straight down at right angles to the lawn surface, or making it with a chamfer or inward slant toward the bed. The former, though easier to make, is more difficult to keep true throughout the year, as the weight of the lawn mower and the pressure of feet along its margin tend to squeeze it out of plumb. The supporting shoulder of the chamfered edge prevents this and when properly kept has a much better appearance.

Digging

No matter how carefully soil spilt on to the grass is removed, some of it remains, and in time the lawn is raised round the margins, thus helping to spoil the general effect of orderliness and symmetry. A simple method which assists in overcoming this difficulty is as follows:—

Divide the bed into two equal parts (A and B in the diagram). Open the trench at C, remove the soil, and place it on a piece of stout scrim or sacking at D. Dig toward E, where a trench will be left, which is filled from the opening trench at F. Then dig the reverse way to G, finishing with an open trench, which is filled with the soil at D.



When digging along the edges always throw the soil inward away from the lawn and dig with the back of the spade toward the edge.

Preparations for Planting

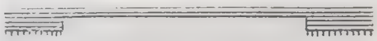
The beds having been dug and levelled and the edges attended to, the next process is to prepare for the planting of them. With the aid of a garden line, a measuring rod, and pegs, mark out the bed so that the plants will be spaced evenly. The outer row of plants, usually referred to as the edging, should be at least 12in. from the edge of the bed; if they are closer, the plants may grow out over the grass and not only smother it, but prove a nuisance when the lawn is being mown.

If possible, choose for the planting a dull day when there is little wind, and make sure that the soil in the boxes or trays containing the plants is moist. With a garden trowel make a hole deep and wide enough to receive the roots comfortably and without their being squeezed into place. With the hands press the soil downward and inward firmly round the roots, taking care not to force the crown of the plant below the general surface level. Too frequently the inexperienced gardener tends to press the soil round the necks of the plants instead of down round the roots. When planted, every plant should be able to withstand a gentle tug with the fingers without being pulled up.

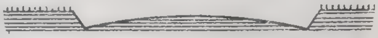
To settle the soil more firmly about the roots and to enable the plants to recover quickly from the check they have received in transplanting, each plant should receive a good watering immediately the bed has been planted. To remove all feet marks and to put a good finish to the bed, the surface soil should be hoed over lightly or touched up with a garden fork.

Pruning of Shrubs

Continue the pruning of spring-flowering shrubs as they pass out of bloom. The hybrid brooms (*Cytisus*), of which there are many beautiful varieties, flower profusely on the growths made during the previous year. If left unpruned after flowering, the bushes soon become open and straggly, and if pruned back to the old wood, they are likely not to recover readily but to die back. To keep the bushes more compact and healthy, and to ensure plenty of vigorous growths to provide flowers during the following year, the growths that have flowered should be cut back to within an inch or two of the old wood.



A lawn edge cut straight down to the surface of a path or flower bed, as above, is easier to make than a chamfered or sloping edge (below), but more difficult to keep true because the weight of the mower and the pressure of feet tend to squeeze it out of plumb.



The evergreen ceanothuses and the prostantheras should be treated similarly. Lilacs will also be passing out of bloom rapidly, and if pruning is necessary to reduce them in size or to improve the shapeliness of the bushes, it should be attended to forthwith.

Care of Roses

All roses should now be in vigorous growth with the flower buds filling out rapidly. Some bushes produce more flower buds than are warranted, and if all are left, they tend to crowd each other, to the detriment of all. When a limited number of well-developed blooms of good size and substance is desired the usual practice is to thin out the flower buds to one to each growth. The terminal bud usually is the strongest, and the subsidiary ones surrounding it are sacrificed to enable it to develop to its maximum. Some growers will say: "But we want a show of bloom rather than a few perfect flowers." The answer is that disbudding leads to a goodly show of well-developed flowers superior in quality and general effect to those of bushes that have not been disbudded. Another point in favour of disbudding is that the more crowded the buds the more greenfly is present; these pests, which increase at an alarming rate, love to feed on the soft, succulent growths and find the shelter provided by the flower buds an ideal feeding and breeding ground. Moreover, for cut flowers one good bloom on a single stem is much more useful than several to a stem. If, despite what has been said in favour of disbudding, the gardener is still unconvinced, he may compromise: Where the bushes produce too many flower buds to each stem he may thin out sufficiently to allow plenty of space between them. The single and semi-double varieties and the polyantha roses, which produce their flowers in clusters, do not require disbudding.

Rose foliage is usually clean and fresh at this season, showing little evidence of such disfiguring diseases as black spot and mildew. Unfortunately, appearances frequently are deceptive, and the gardener must not be lulled into the belief that so far all is well and disease is absent.

Such diseases as mildew and black spot are always present and require only the right conditions to assume epidemic proportions. Prevention is better than cure, and the gardener must spray his bushes as a preventive measure before there is any sign of attack.

For the purpose any of the reputable fungicides such as lime sulphur is useful. An old safeguard against disease and one that has proved effective is to dissolve 1oz. of potassium sulphide (liver of sulphur) in hot water, dilute it with 2 gallons of water, and add a tablespoon of soft soap which has been dissolved in hot

[*Green and Hahn Ltd. photos.*

Left—A young cyclamen in a 4in. pot blooming for the first time. Right—A 2-year-old cyclamen, grown in a 6in. pot, in full flower in August. Both plants are now ripening off and will be rested and repotted about the end of next February.

[*Green and Hahn Ltd. photos.*

Left—*Primula malacoides* in a 5in. pot in full flower in August. The seed of this plant was sown in the previous November. Right—*Primula obconica* in a 6in. pot coming into bloom in August. The seed was sown in the first week of the previous December, and the plant continued to bloom for several weeks.

water; the soft soap acts as a spreader and also destroys greenfly. When spraying choose a calm, fine day with no rain imminent. The spray should be applied in a fine mist and should reach every part of the stems and foliage, upper and under surfaces. Drenching the bushes with spray is unnecessary, but rather an endeavour should be made to cover the surfaces of stems, leaves, and flower buds with a film of the solution. Endeavour to give two sprayings before the flower buds begin to show colour. To be effective the spray must adhere to and dry on the foliage; if it is washed off by rain, a large part of its effectiveness is lost.

As the flower buds swell, established rose bushes—that is, those that have not been newly planted—may be fed with liquid manure. For such a purpose suspend a sack half-filled with cow or sheep manure in a barrel of water. After a few days the liquid, diluted with water to the colour of weak tea, can be applied to roses. Two or three applications, at the rate of half a small bucketful to each bush, would not be too much.

Herbaceous Borders

Herbaceous or mixed flower borders will rapidly be reaching their maximum displays and should have regular attention. Early-flowering subjects, such as the pyrethrums and scabious should have all flower heads removed as soon as they have finished blooming. By this means the plants will be induced to continue to flower for longer than if they were allowed to produce seed heads.

Perennial lupins should also be treated in this way. If the main flower spike is cut off as soon as it is past its prime, a second crop of bloom will be produced from the lateral buds lower down the stem. These second spikes, though they are not of the size and perfection of the first flowers, carry on the display for several additional weeks and are also quite useful as cut flowers.

Pansies may be maintained in a longer succession of bloom if the seed pods are removed regularly before they have time to ripen. This may appear tedious, but lovers of these plants spare no effort to obtain the maximum results. Pansies grow best in a cool soil and will not tolerate dry conditions at the roots, so they should be watered copiously during dry weather. The vigour of the plants may also be improved at this season by lightly sifting into the crowns a top dressing of old decayed manure and leaf mould.

Delphiniums will be rapidly developing their tall flower spikes and, as they are very subject to storm damage, the flower stems should be supported adequately with garden stakes. When staking or supporting plants endeavour to hide the stakes as much as possible and to make ties secure but inconspicuous. Many tall-growing herbaceous perennials, such as helenium Riverton Gem, may be made more bushy and compact by pinching out the soft tips of the stems at this time of the year. This pinching out or stopping prevents the plants from becoming too "leggy" and induces the lateral buds to break into growth, these secondary growths producing a greater profusion of bloom.

All vacant spaces among herbaceous perennial plants should be filled with annuals to provide further displays of colour. At every opportunity keep the surface soil well worked with the hoe or, better, with the border fork.

Trimming of Hedges

A neat, well-kept hedge well furnished with foliage from ground level to crown is always admired and should be an integral part of the garden. Most hedges should be making rapid growth now and the first trimming of the season should be attended to at once. When using the hedge shears or hedge knife endeavour to trim or cut the sides evenly throughout the length of the hedge. Some of the plants tend to develop more robust growth than others and therefore require harder cutting. Too frequently the gardener, to save himself exertion, will cut back only into the soft wood, with the result that within a year or two bulges develop in the line of the hedge and, further, in the course of

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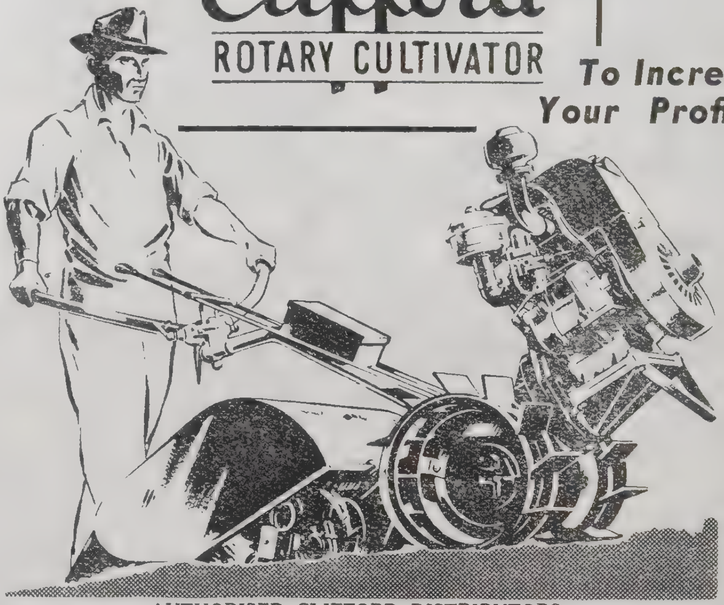

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time it becomes so wide that not only is it difficult to reach across the top, but the hedge encroaches much beyond its proper confines.

Growth is always stronger toward the top and, unless this portion is cut harder than the base, it may happen that the base, deprived of its fair share of light and air, gradually ceases to maintain steady growth, with the result that gaps eventually appear in the hedge near ground level. To overcome this, endeavour to prune inward from the base toward the top of the hedge so that the base is always wider than the crown. Keep the soil at the base of the hedge well cultivated and never allow weeds to encroach on to it; these also exclude air and light and frequently are the cause of the lower growth dying back.

Dormancy of Cyclamen

The greenhouse cyclamen *Cyclamen persicum* is one of the most popular and most beautiful of plants. Plants that have been in flower throughout the winter and spring will now be declining rapidly, and water should be withheld gradually until the foliage ripens off.

Many amateurs attempting to grow cyclamen complain that the corms fail to make satisfactory growth the year after they have been rested. One of the causes of this failure to recover from the dormant state is that the plants have been dried off too much. A number of the comparatively-thick, fleshy roots are developed from the base of the corm. From these main arterial roots spring innumerable fibrous secondary rootlets, and these are the true feeding organs, which are most active when the plant is in full growth. Having passed through its cycle of flowering, the plant rests, the feeding rootlets become less active, and as the moisture in the soil dries out they shrivel up and die. However, the fleshy main roots should not die but should remain intact. It is at this stage that the mistake is frequently made. As the plants ripen off, it is not uncommon to put them away on a shelf where they receive no water at all and, as often as not, are forgotten until after the appropriate time for them to receive attention and be started into fresh growth. As a result of this neglect the fleshy main roots die away, the corms shrivel, and it is difficult to start them into active growth once more. Therefore, during the resting period the plants should receive water occasionally to keep the soil from becoming too dry. It is a good plan to place the pots in a cold frame where they will not be overlooked and can receive attention readily when necessary.

The plants do not remain dormant for more than 2 or 3 months. During February they start into fresh growth, and at this stage they may be knocked out of the pots, the old soil removed carefully without damaging the main roots, and the plants repotted into fresh soil and watered lightly until growth becomes more vigorous.

Other Work for November

Climbing plants such as many of the clematis will require attention. The young growths should be trained in the way they should go.

[*Douglas Elliott photo.*

***Clematis jackmani* is one of the climbing plants which require attention at this time of year. The young growths should be trained in the way they should go.**

Rambler and climbing roses will be producing strong young growths, and frequently such growths, when they grow outward from the parent stems on to a lawn or pathway, prove something of a nuisance and are cut off. Such action is wrong, as these strong, vigorous growths replenish the old, worn-out wood and rejuvenate the bushes. They should be tied in carefully out of the way and encouraged to grow so that they may be employed to advantage when the next season's pruning is attended to.

In the cooler districts succession sowings in open ground may still be made of such hardy annuals as sweet peas, godetias, and clarkias.

For late flowering continue to plant gladioli. Some growers continue to plant the corms into December. On an average, gladioli will flower about 100 days after being planted. Corms required for late planting should be stored in as cool a place as possible to prevent them from breaking into growth before planting time.

As rhododendrons and azaleas pass out of flower the old flower heads should be removed with the finger and thumb to allow the growth buds at the bases of the flower heads to develop into growth without impediment.

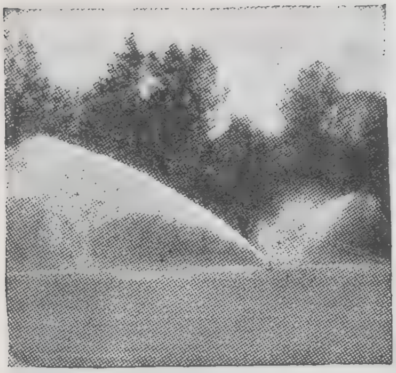
Plants to Propagate

Sow seed of sweet william required for next year either in boxes in a cold frame or in a prepared bed in the open. When the seedlings are large enough to be handled comfortably transplant them to a well-prepared piece of ground in the reserve garden and let them grow on until they are ready to be planted into their flowering quarters during autumn. When well grown a patch of sweet william provides a colourful display during December and January. Though a perennial, sweet william gives best results when treated as a biennial, and young, vigorous plants should be raised from seed each year and discarded as soon as they have flowered.

For succession in the greenhouse continue to sow seeds of cinerarias, *Primula malacoides, P. sinensis,* and *P. obconica.*

Tuberous-rooted begonias will be making rapid growth, and where a tuber has several shoots some can be removed and used as cuttings to increase the stock.

Dahlia cuttings may still be taken. Though the resultant plants will not produce worth-while flowers this season, they will form sturdy young tubers which will give good results the following year.



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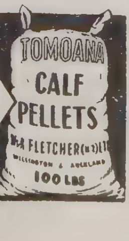

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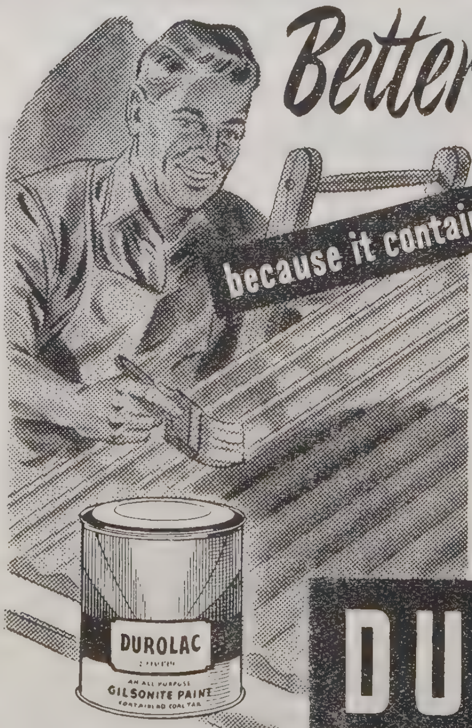

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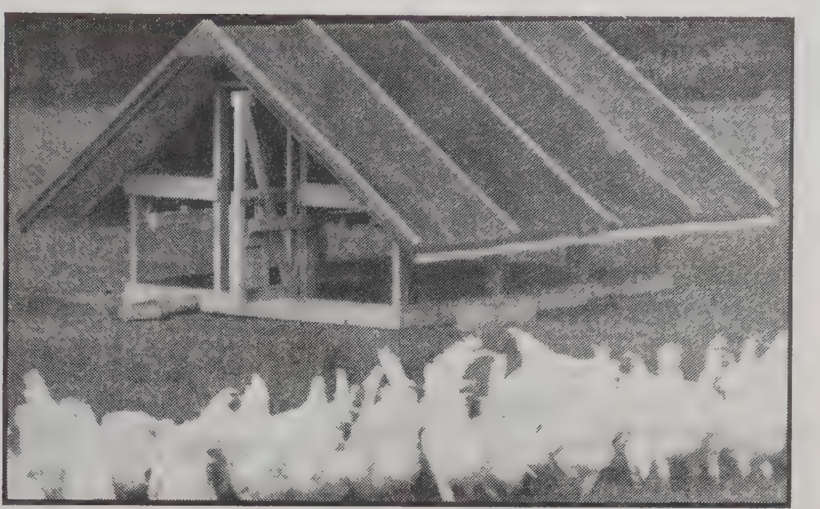
Household Poultry: Rearing and Feeding Growing Birds—Culling Chickens—Discarding Unprofitable Birds

AN important requirement of a good poultry ration is economy. The object of the poultry farmer is to make a profit and, even though the householder might be satisfied to run a few hens primarily for an adequate supply of fresh eggs, he should not overlook the cost of production. The cost of materials must bear some relation to the egg value obtained. The householder might be willing to make no allowance for the labour involved in managing the hens, but the sideline and commercial poultry keeper must include the value of labour in the cost-accounting system. The householder cannot really justify his keeping poultry if he is not producing eggs at an economic rate. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, gives advice on feeding and rearing growing pullets, culling chicks, and maintaining quality layers.



An easily-constructed type of colony house for rearing growing stock. Cockerels should be sorted out early to give the pullets full opportunity to develop.

NORMALLY, high egg production ensures profit, but a high rate of production is not always economic. If very expensive feeds are used to get the greater production, the extra eggs may not compensate for the additional cost of the feed.

Availability of feeding materials is of utmost importance. In general, it is cheaper to feed products that are grown near at hand. In country districts where wheat, maize, barley, or oats are grown the specialty of the district should be used as much as possible in the ration rather than grains or mash freighted in at extra cost. At present pollard and bran are not in adequate supply and are being reserved for inclusion in standard chick and laying mashes, but the time may return when the extraction rate of flour will be lowered and more grain offals will be available. When such by-products are cheaper than grains it is advisable to make greater use of them, but while grains, taking into account their food value and weights to the bushel, are obtainable in any locality more cheaply than other foodstuffs the poultry keeper should amend the feeding programme for the sake of economy.

The belief that fowls must be fed an average of 2oz. of mash and 2oz. of wheat each daily must be dispelled. Whether layers are fed part mash and part grain, all mash, or all grain does not matter a great deal. Nor does it make much difference whether the mash is fed wet or dry, whether the grain is hard, soaked, or sprouted, or whether the birds are fed in the litter or from a trough or hopper. The system in itself is not the decisive factor; the varying cost of feeds and the labour required to feed out that food are decisive. Of course, whatever the feeding system there must be a proper balance between carbohydrates and proteins and sufficient food must be given.

Rearing Pullets

Correct rearing of young pullets intended to be layers is one of the most important factors in poultry management. Pullets poorly grown show a higher mortality in the laying house and lack the stamina for high yields. Healthy, vigorous, well-raised pullets are the foundation for success. An important requisite for such rearing is a satisfactory free range. Grown birds can be kept successfully on the intensive system, but growing pullets should have outside runs. Many amateurs are deluded by the fact that rearing good stock seems easy for them. They see or hear of experienced poultry farmers having trouble and conclude that they themselves have some special or natural ability. It is commonly found that beginners achieve the best results with raising pullets in the first year, and it would appear that in most of these cases the character of the range had much to do with the success. Clean land is of primary importance for consistent success in growing pullets.

A good method for ranging young stock is to work them in with the cropping or gardening system. The chickens should be handled as one part of the crop rotation, and each section then helps the other. The cropping area gets the manure and the chicks get a fresh piece of ground that has not had droppings on it for years. Housing is important, but not to the same extent as clean range. It is natural for poultry to roost in trees, and young stock that roost out during the warm months usually are healthy. However, roosting in trees is not always satisfactory. Apart from the danger from enemies, it is almost impossible to clean away the droppings or to cope with red mite and body lice if the pullets once get them and these parasites get on to the trees. Catching the pullets for examination, leg banding, culling, or placing in permanent houses is also made difficult.

Houses for growing stock should provide natural conditions. There should be an abundance of fresh air and the houses should be kept clean. Pullets should be let out of the house early in the morning if they are to make their best development. It is natural for the birds to be up at the break of day and out foraging. Birds grow better under cool conditions and can withstand cold better than excess heat. When they are kept penned up late they miss part of the natural feeding period and waste nervous energy and vitality in struggling and crowding to get out of an environment which often is none too sanitary.

Another essential of good management is sorting over the flock and separating the cockerels from the pullets and the culls from the quality birds. Both in brooding and in rearing, smaller numbers can be handled more successfully than large flocks.

An abundance of fresh, clean water must be provided. Pullets will not develop properly if the water supply is neglected. Water is even more necessary to life than feed.

Feeding Growing Birds

Chicks should be given normal growing rations that are not too stimulating yet which supply the proper elements for growth. Last month's advice about foodstuffs, minerals, vitamins, and greenfeeds should not be overlooked.

Regularity in feeding is also important. Usually hand feeding mash and grains is the most satisfactory method, but excellent results are obtainable from hopper feeding of dry mash or grains or both. The labour saved by hopper feeding must be taken into consideration. Hoppers and drinking vessels must be in a place frequented by the chickens throughout the day. Advantage should be taken of the fact that growing pullets do not like too much direct, hot sunshine. Putting the container in the shade obviates the tendency for lethargy to deter the stock from walking from the shade to hoppers and drinkers in a sunny place.

Roundworm infestation of poultry has become quite serious in late years. This parasite can be controlled by clean land and, to an extent, proper feeding. If plenty of health-producing feeds are given, such as greens and bran, worms do not have the opportunity to become serious. Worms appear to affect most severely flocks raised under unnatural or too artificial conditions. A normal functioning of the digestive tract helps to eliminate them.

Pullets that begin laying too early are likely to lay a few eggs and then go into a neck moult. Some poultry rearers believe they can prevent this by what is called "holding back" the pullets from laying by special feeding methods. The idea is to prevent the birds coming into production until they have grown to full size. In practice it is impossible to delay production appreciably in a strain that has been bred for high egg yields. Such strains begin laying at about a certain age. If the ration is restricted and made protein deficient to try to hold them back, the pullets draw on body reserves for the substance to make the eggs. They lay for as long as the reserve of nutrients lasts and then break down. The damage caused by holding back has been done so long before corrective measures are attempted that the time for rectification is past. Growth and development are slow, steady processes.

On the other hand, maturity must not be forced. Over-stimulation cannot be compensated for later by a starvation diet. Both types of abnormal feeding are likely to injure health and vigour.

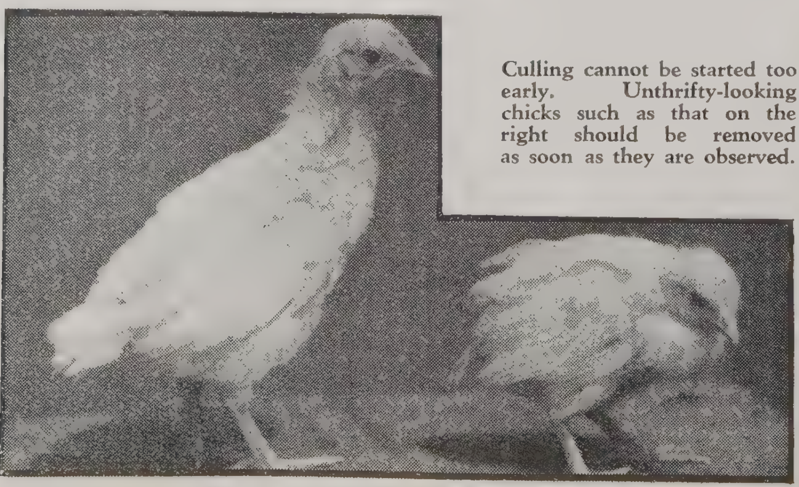
Fowls should be regarded as egg-producing factories. Economical and efficient results would not be expected in an undersized factory with improper conditions and poor machinery. Pullets must be properly bred, properly grown, properly housed, and properly prepared for the laying pen.

Judging the adequacy of the quantity of the diet is simple. The behaviour of the birds supplies the answer—the manner in which the litter is scratched up and stirred around, showing whether they are active; the amount of grain left in the litter from the previous feeding; and with wet-mash feeding how long they take to eat it. If they take less than 20 minutes for a meal, they are not getting enough; if they take longer than 30 minutes, probably too much mash is being fed. In cold weather, or when the fowls are laying heavily, additional food should be allowed. A dry-mash hopper from which the birds can help themselves is an advantage no matter what feeding system is adopted.

Transfer to Laying House

Maturing pullets should be transferred to their permanent laying house early. If they are allowed to stay on the range until they begin to lay, serious setbacks are likely when they are transferred inside. Quite often they are badly frightened by this move and, as their whole habit of life is changed, they may be thrown off the lay and into a moult. The time to put pullets into the laying house is about a fortnight before they are ready to lay. This is at the "reddening-up" stage, when their combs, wattles, and pelvic bones indicate that they are close to production. They should be handled gently at this stage—in fact, at all stages.

When first placed in the laying house pullets must be watched carefully to see that they perch properly. Though they may have been roosting correctly beforehand, it is commonly found that some will not do so when changed to new quarters. Bad habits can be eliminated by an owner who spends a few minutes with the pullets at sunset for a few days.



Culling cannot be started too early. Unthrifty-looking chicks such as that on the right should be removed as soon as they are observed.

Culling Chickens

Too many poultry keepers think of culling in terms of throwing out aged hens, and too many amateurs consider it beyond their abilities—almost in the nature of a mystic art. A common query is when the first cull should be made. The answer is to start early and cull frequently, beginning with the day-old chicks coming off the incubator tray. It is impossible to begin culling too soon.

Weak and unthrifty-looking chicks should be removed as fast as they are recognised. They are a danger to the rest, especially during the first 3 weeks. As the chicks continue to grow, vigorous culling should be continued. When they are small it is more economical to destroy the culled chicks. After they are 6 to 8 weeks old their condition must decide whether they are suitable to be fattened for eating.

Culling should be a continuous process, the inferior birds being removed as they are observed. Apart from accidents, a bird cannot be a good type one day and a cull the next. In culling first consideration should be given to health and vigour.

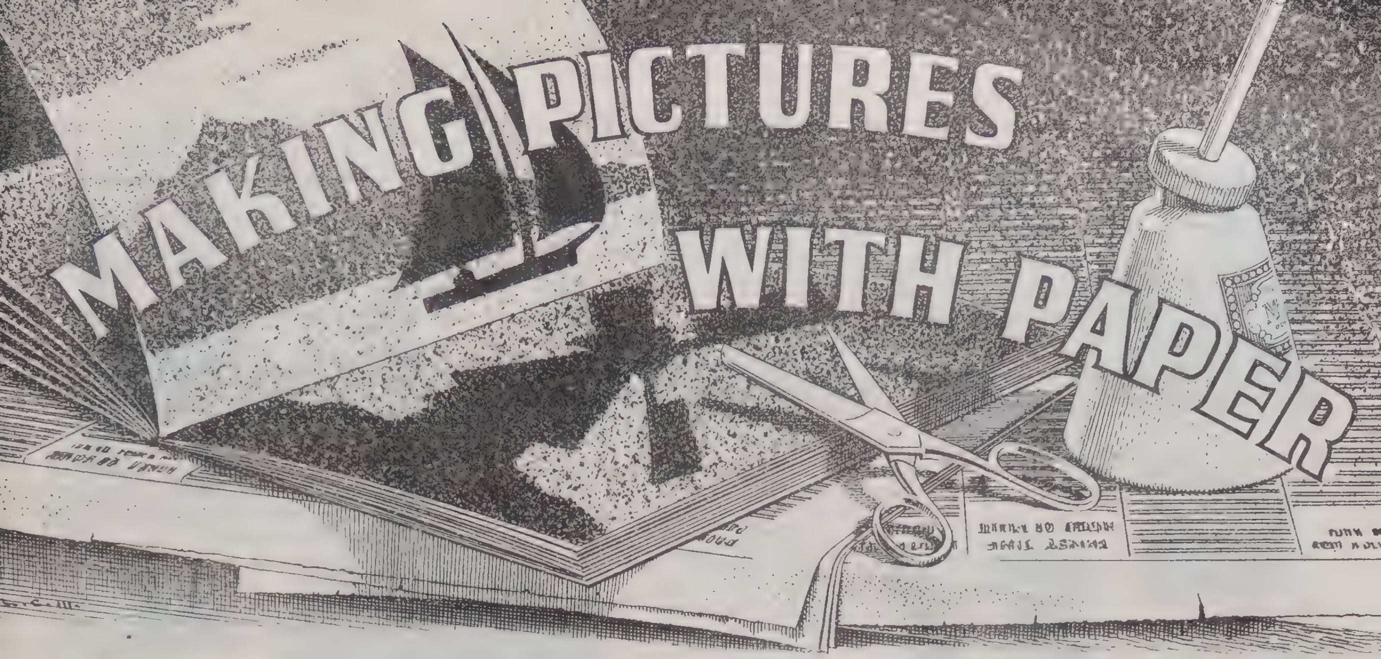
Discarding Unprofitable Birds

No fixed rules can be laid down for culling or for distinguishing a cull from a satisfactory bird. No other feature of poultry keeping is as likely to be influenced by the prejudices of the owner.

The breeder must cull for type and trueness to standard, but the household poultry keeper and the sideliner are concerned only with egg-producing ability. That simplifies the work considerably and reduces the culls to one type—those that are not returning a profit. Whether that is caused by a breakdown in health or stamina or by poor egg-producing ability does not matter; the effect is the same and the bird is culled out.

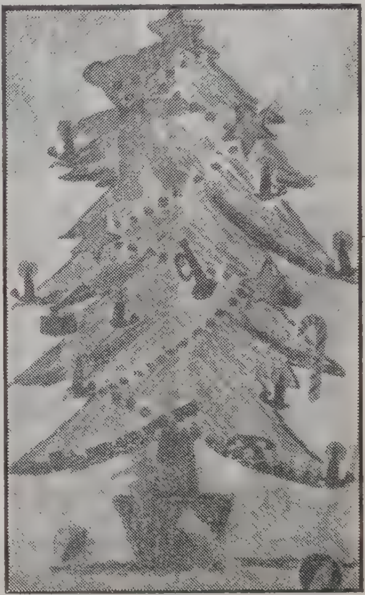
The task is then reduced to simple ability to recognise an average layer. The high producers are soon picked out, but all birds cannot be expected to be equally good. Differences from the average should be watched for. For example, if in late spring 90 per cent. of White Leghorn pullets show worn-down tails and feathers and pale shanks, obviously those are good signs. If 10 per cent. show bright yellow shanks, those are the ones to be treated with suspicion; they should be picked up and the pelvic bones felt. Hard, tight, close-together bones indicate the non-producer.

The best profits cannot be expected from pullets lacking in quality, so the laying pen should not be cluttered up with poor-type pullets or hens. Each bird off the lay requires another bird in lay to counteract her feeding expense, which in effect reduces the profit-making capacity of the flock by two birds. Culling unprofitable birds brings two advantages—a reduction of meat bills through the consumption of suitable culls and an increase in the profit column in the record books.



MAKING PICTURES WITH PAPER

BOTH paper tearing and paper cutting are arts that lend themselves to picture making. When children develop sufficient skill in tearing or cutting out objects the next step is to combine their work into pictures to illustrate a story or nursery rhyme. That is the stage described in this article, the sixth of a series on child care and development by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch.



FOR the paper-tearing picture illustrated on this page, "Jack and Jill," the dramatic moment in the story was chosen when Jack falls and Jill comes tumbling after him. One large piece of torn white paper represents the hill with the well at the top.

Different children choose different incidents in the same story for their pictures. The story of "The Three Bears" could be illustrated by a child of 5. The picture could contain a small house, trees, and the bears, or a house with Goldilocks jumping out of the window and a bear running after her.

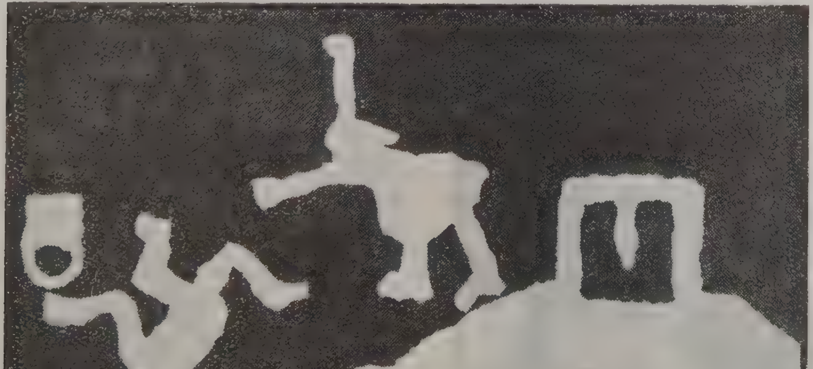
Pictures can be very attractive when coloured paper is used. Even scraps of coloured wallpaper can be pressed into service—green for trees, brown for bears, red for the house, and Goldilocks in a yellow dress.

Paper-cutting Pictures

The making of cut-out pictures should begin with one colour, but later several colours may be introduced. For the purposes of illustration the two pictures shown with this article, "A Country Haymaking Scene" and "The Coming of Santa Claus," were made with only white, black, and grey paper.

Haymaking Scene

The basis of the haymaking scene is a piece of stiff grey carton paper covered entirely with white writing paper. The long row of hills in the background is cut out in grey paper and pasted in, leaving the white sky above. The hayrick which the men are building is cut out in grey paper and pasted into position, with mounds of mown grass, also in grey paper, scattered about. The black figures of the haymakers are pasted in next, and then the trees.

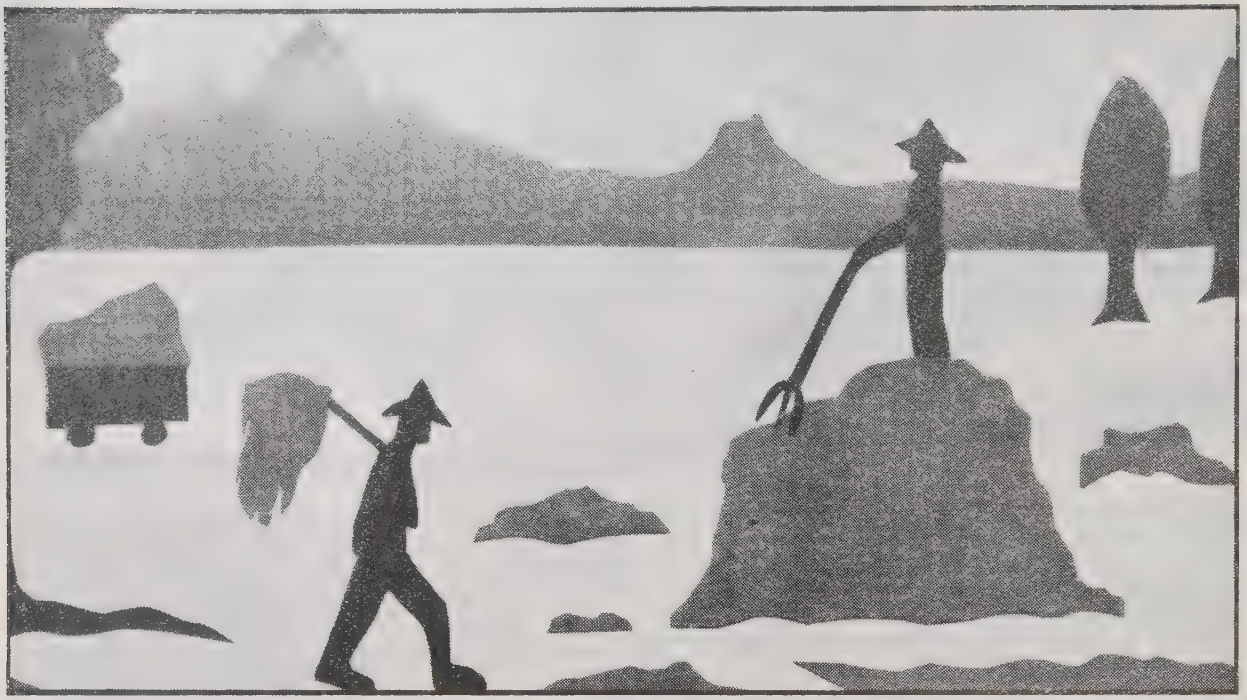


Appropriate coloured papers would make a charming picture, giving the child scope for learning to balance colour as well as the figure composition of the picture.

Santa Claus Picture

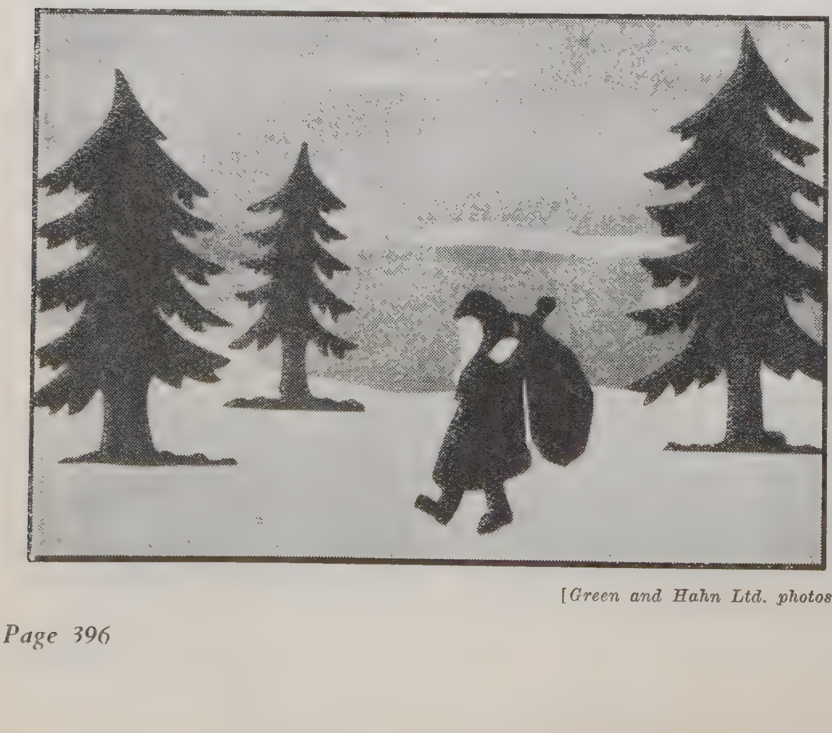
For the effects in the Santa Claus picture grey carton paper was used as a basis and the snowy ground was represented by white paper about one third the height of the sheet, with a wavy line to denote rising ground in the distance. Clouds and the moon are white on the grey sky (the original grey carton paper). The black trees are silhouetted against both the grey

Photographs by Green and Hahn Ltd.



sky and the white ground, as is the figure of Santa Claus himself. Santa Claus, the central figure, is so placed that his white face and beard show up against the grey sky. If coloured paper could be used, Santa Claus could be cut out of red, with a blue bag of toys. Trees could be green, but black or dark brown does as well.

These pictures should be about 2ft. wide by 1ft. 6in. for a child; anything smaller presents too much difficulty for little fingers. Of course, the child's picture should be recognised and used as a picture by being hung on a wall.



[*Green and Hahn Ltd. photos.*

Christmas Tree Picture

An easier type of picture for little children was thought of by a very busy but bright young mother. It was specially made as part of the preparation for the Christmas festivities. Some of it was prepared on rainy days when time hung heavily. It was really like a serial.

The mother procured the end of a roll of newsprint. Two widths were pasted together lengthwise and fastened to the wall with drawing pins, reaching to the ceiling. On the paper she painted a life-size Christmas tree. In her spare time she drew in outline on more newsprint the usual kinds of toys that are found on Christmas trees about their real size—teddy bears, trumpets, trains, guns, dolls, and bats and balls. While she was busy with housework her two children coloured the toy outlines with crayons and cut them out. She demanded that all the toys should be well covered with crayon, so the children had to work slowly and carefully. When they were finished she and the children pasted them on the tree. Candles were cut from coloured paper and stuck on the ends of the branches, with a yellow flame in crayon over each one. (A circle of yellow paper behind the candle is as good.) Stars were cut from silver paper and hoarded chocolate wrappings, and so were balls. The children worked at it enthusiastically.

Another mother who has had large experience with this sort of occupation with her own lively quartet as well as with larger groups of children has found that the same idea can be even more successfully carried out in a larger family by giving each child a Christmas tree picture of his own to make, but on a much smaller scale. These Christmas trees are used as a frieze above the mantelpiece during the Christmas festivities. The older ones think out their own toys and use coloured paper as well as crayon, but the strong point of the crayon toys is the provision of an occupation that keeps little people happily busy for longer periods. It is not necessary that the whole picture be finished at once or in a few days; it can be a wet-day occupation for weeks or even months before Christmas. Its association with the actual and desired toys that come at Christmas time is sufficient to maintain children's interest.

◆

GAMES FOR PLAYING WITH BABIES

THE importance of the play hour was stressed in an article on speech development in the August "Journal" in the series on child care and development by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch. The kinds of play suitable were listed, leading to requests for more details of the jingles, finger and toe plays, and action songs by which children are introduced casually to good speech and social relationships. They are given in this article.

A BOND of fun and sympathy is woven between mother and child as she sings the traditional ditties. She may pat the bottoms of the child's feet, first one and then the other, saying:—

Shoe the old horse, shoe the old mare,
Let the little colt go bare, bare, bare.

Then she may take a foot in each hand, crossing the legs first one way and then the other way, in rhythm to the lines:—

Leg over, leg over, dog went to Dover,
When he got there, hop! he went over.

with the last line lifting both legs into the air, and raising the body slightly to make a slight bounce.

Playing with individual toes has always been a game which brings squeals and gives delight to the growing baby, as well as providing exercise for the muscles of the toes. The time-worn verse runs as follows, beginning with the big toe:—

This little pig went to market,
This little pig stayed at home,
This little pig had roast beef,
This little pig had none,
And this little pig cried,
"Wee, wee, wee," all the way home.

In China a baby's toes are played with in the same fashion to the following jingle:—

This little one eats grass,
This little one eats hay,
This little one drinks water,
This little one runs away.
This little one does nothing
But just lies down all day.

With the last line big sister or mother playfully slaps the soles of baby's feet.

When the child is big enough to have his father place him across his foot, holding his hands, and play "Ride a Cock Horse to Banbury Cross" the child's delight is infectious:—

Ride a cock horse to Banbury Cross
To see a white lady on a white horse.
With rings on her fingers
And bells on her toes,
She shall have music,
Wherever she goes.

To the last two lines the child is bounced up and down.

In another game the child sits on the parent's lap, setting out on a make-believe ride to the accompaniment of:—

This is the way the lady rides—
Trot, trot, trot (gently).
This is the way the gentleman rides—
Gallop, gallop, gallop (stately).
And this is the way the farmer rides—
Bumpity, bumpity, bump (with vigorous bumping from side to side and up and down).

Learning about Himself

All games and plays of children are based on physical development. The baby begins to realise that he has ears, eyes, and nose like his mother. He is learning about himself as well as developing a vocabulary in naming different parts of his body.

Two little eyes to open and close,
Two little ears and one little nose,
Two little lips and one little chin,
And two little cheeks with a rose shut in.

Two little elbows, dimpled and sweet,
Two little shoes and two little feet,
Two little shoulders, stout and strong,
And two little hands busy all day long.

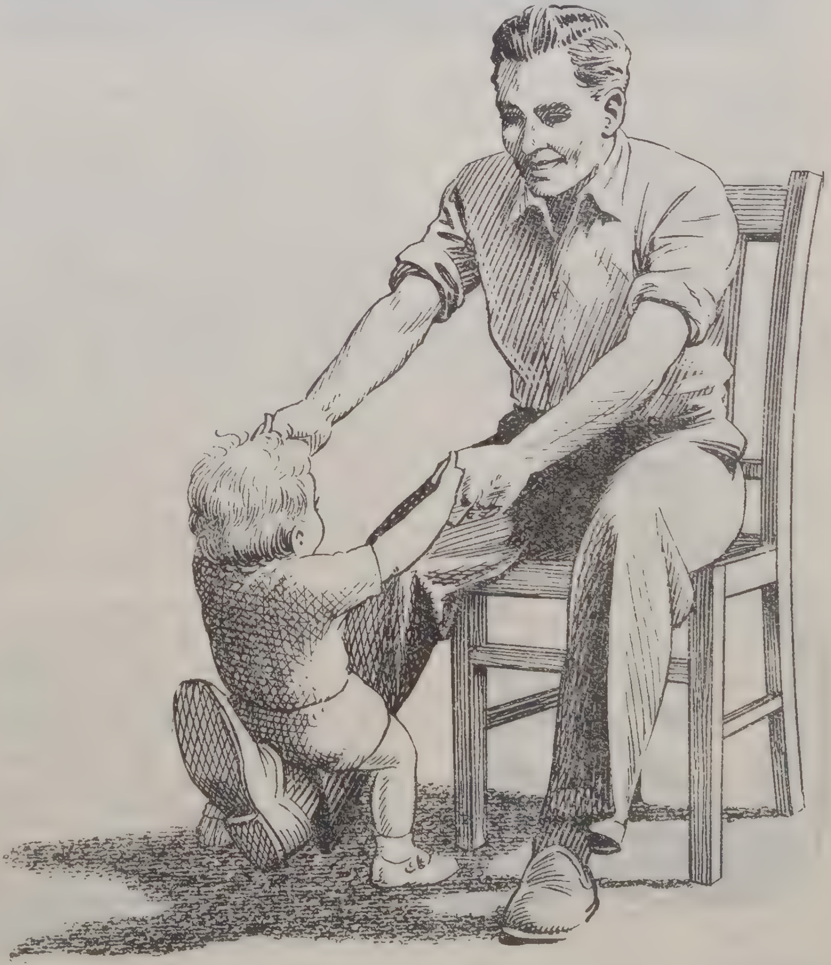
Knock at the door of a little white house (forehead);
I wonder who lives inside.
Peep in here at a window bright (eyes)—
Now don't you try to hide.
Lift the latch with a cautious hand (nose)
Or someone will turn the key.
Then walk in through the doors ajar (mouth)
But don't you stay for tea,
For the little white dogs that live inside (teeth)
Might gobble you up, you see.

* * *

Knock at the door (forehead),
Peep in (eyes),
Lift up the latch (nose),
And walk in (mouth).
Take a chair right down there (hastily tickle neck).

Dramatic action with the fingers, combined with imagination (which the child has in abundance), illustrates these rhymes and affords great amusement:—

Naming and counting fingers—
"I am one," said little thumb.
"I am two," said pointer.
"I am three," the tall man said.
"I am four," said ring finger.
"And I am five," the baby cried;
"You could not catch me if you tried."



GAMES FOR PLAYING WITH BABIES . . .

Five little chickens. each finger in turn representing a chicken-

Said the first little chicken with a
queer little squirm,
"I wish I could find a nice fat worm."
Said the second chicken with an odd
little shrug,
"I wish I could find a nice fat bug."
Said the third little chicken with a
sigh of relief,
"I wish I could find a nice green leaf."
Said the fourth little chicken with a
faint little moan,
"I wish I could find a wee gravel
stone."
Said the fifth little chicken with a
queer little squeal,
"I wish I could find some nice yellow
meal."
"Now come here," said the mother
from the green garden patch,
"If you want any breakfast, come here
and scratch" (spoken somewhat
sternly).

Planting five seeds in a row—

One for the blackbird,
One for the crow,
One for the cutworm,
And two to grow.

As each of the first three lines is said one finger is touched, and two fingers at the last.

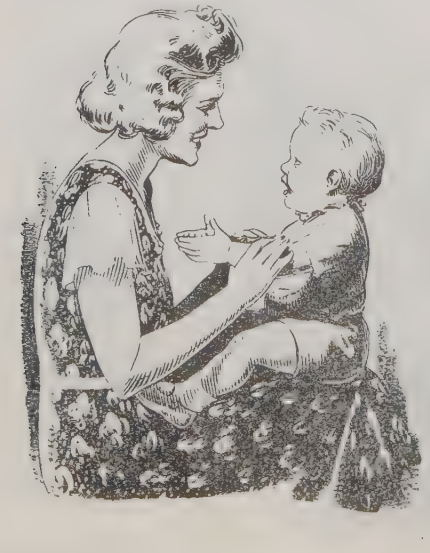
As the child's vocabulary increases and he can follow directions he will wish to say and act out these finger plays, and because of his desire to hear them many times he will soon know them off by heart.

A simple, quiet exercise can be given while the child is sitting in a chair by stretching the arms forward from the shoulders and acting the words with hands as he says:—

Open, shut, open, shut,
And give a little slap;
Open, shut, open, shut,
And lay them in your lap.

Games for the Very Young

In a household fortunate enough to have a clock with a pendulum one of the simplest of games for very young children is the imitation of a pendulum. Before playing the game, call the child's attention to the clock, saying "tick, tock, tick, tock," and show him the pendulum. When he is old enough to sit upright in his mother's lap, gently swing one of his arms from side to side like the pendulum, saying at the same time "tick, tock, tick, tock." At first it will be necessary to move the baby's arms each time the game is played, but after a little time he can be encouraged to do it for himself.



In playing this or any little game great care should be exercised that the baby is not forced in the slightest degree. If he shows no inclination for the game, it is proof that his mind is not ready for it and it should be left until later.

The well-known nursery rhyme "Pat-a-cake, Pat-a-cake, Baker's Man," is suitable for a small child. Here it is:—

Pat-a-cake, pat-a-cake, baker's man,
Make me a cake as fast as you can.
Prick it, pat it, and mark it with "B,"
And put it in the oven for Baby and
me.

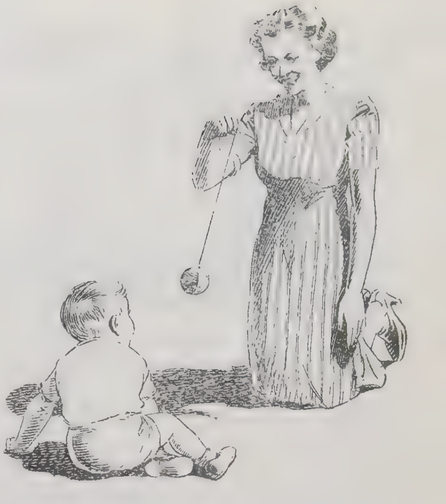
The child sits on his mother's knee facing her. She takes hold of both his arms so that they are horizontal and the palms touch, then claps his hands together as she repeats the rhyme. With the last two lines she imitates the movements in the baby's palm.

Making a nest is a game suitable for a child of between 1 and 2 years, according to the stage of development. The child should have been shown a nest, or a picture of one, and his attention should have been drawn to the birds in the garden. Make a nest with the cupped hands with the thumbs tucked inside and say that there are eggs in the nest. When the eggs are hatched the tips of their thumbs should be raised to represent the little birds. When the thumbs are moved the mother should say "peep, peep." A child will gurgle with delight when his mother imitates the cries of the young birds, and soon he will be saying "peep, peep," himself. The mother should play this game several times before encouraging the child to do so.

The finger piano is a hand play in which the fingers of the right hand are pressed down as though playing the piano. The mother should sing as she presses down each note, and later the child will attempt to sing. He will not be able to reproduce the tone correctly, but his vocal organs will be exercised. Do not force any response from the baby.

Counting on the fingers is an excellent game which familiarises the child with the sound of the numerals. The hand is spread out in a natural position and as each finger is named—one, two, three, four, five—it is closed over the palm. When all the fingers are down the mother can pretend that he must stay quite still until they awake; a few seconds' stillness, of course, is enough. "Ten Little Nigger Boys" can be played with the fingers while singing.

Other games of this kind can be invented. Raised interlaced fingers, for example, make a window; fingers pressed together while held horizontally make a bridge. These games are much more effective when set to little tunes. Most mothers, whether musically trained or not, can and do sing rhythmic melodies to their babies.



Ball Games

As a baby grows older he should learn to handle other objects besides his limbs, fingers, and toes, and nothing is better than a ball with which to begin. It should be small enough for his hand to grasp, and if home-made balls of various colours are used, his sense of colour can be both satisfied and cultivated. Ball games develop the sight, for the eye has to follow the movements of the ball, and they also bring into play most of the muscles of the body. Games for a child of a year to 18 months old must necessarily be very simple. The mother can toss the ball—very little tosses, of course—or she can roll it gently, and then give it to the baby, who will try to imitate these actions, not always successfully and often very uncouthly. Preferably, one colour should be used at a time, beginning with the primary colours, red, yellow, and blue. Later new balls of orange, violet, and green may be made. Attach the ball to a string and move it gently to and fro like a pendulum, at the same time saying "tick tock."

As the child begins to talk the ball serves as a subject of conversation between mother and child, thereby helping in the child's development in several ways. He will learn that the ball is round, red or blue, hard or soft, that is can be thrown, and that some balls will bounce. All these facts should come quite casually into the chatter and certainly not all at once. Anything which appears to be "teaching" the child must be avoided. It must be a game, in which he feels thoroughly secure and happy in being loved and is ready to respond and unfold his natural capacities. To be worth while, that part of the day given to jingles and games must be among the most pleasurable and satisfying times in his experience.

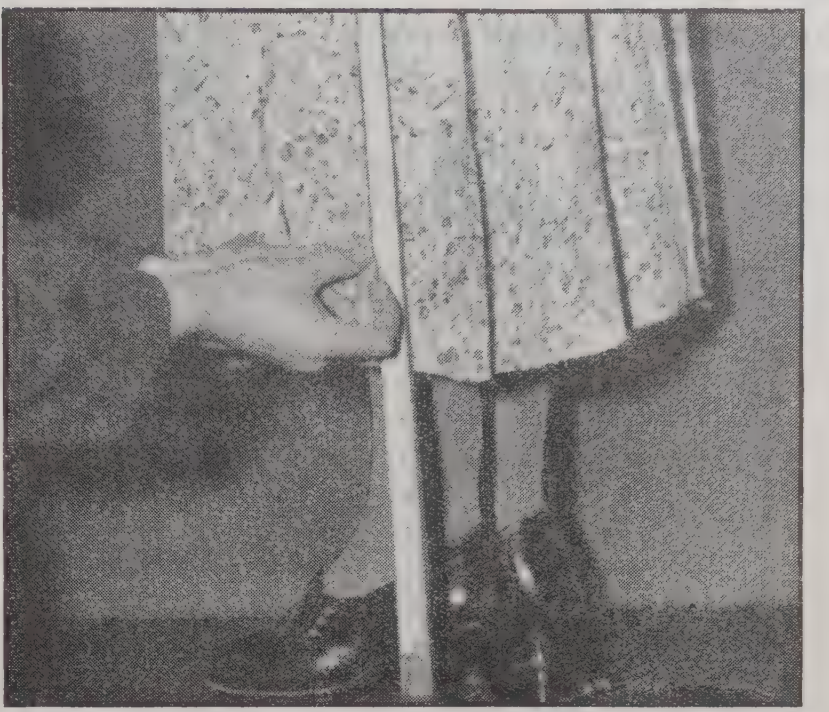
Acknowledgments

H. M. Heaton—"Home Training for Young Children."

Maude Nash—"Children's Occupations."

MEASURING AND MAKING HEMS

A BADLY-MADE hem can spoil the appearance of an otherwise good-looking garment. Unless a hem is intended to be decorative, it should be as inconspicuous as possible and a good hem should be even in width, flat, and regularly stitched. Methods of making hems with all these virtues are described in this article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin.



[Jack Welsh and Sons photo.

A measuring stand being used to mark a hemline. Pins are put in horizontally every 3 or 4in.

ATTEMPTING to make a hem on a garment before all the seams are finished and pressed is a mistake. In practice a good dressmaker usually does the hem last. It is wise to hang up a garment which is being made whenever it has to be put aside. Even a skirt may be hung in the early stages of making by pinning the top to strips of cloth over a coathanger or some other means of support. If a garment is made in one day, it should be hung at least overnight before the hem is levelled; anything cut on the bias or with seams falling on the bias is better hung for several days. This allows any stretching or drooping to take place before the hem is made.

Nothing looks worse than a hem which is unintentionally irregular. Even when a garment has been cut from a commercial pattern it is important to level the hem, for skirts hang differently on different figures and fabrics do not all stretch to the same extent when cut.

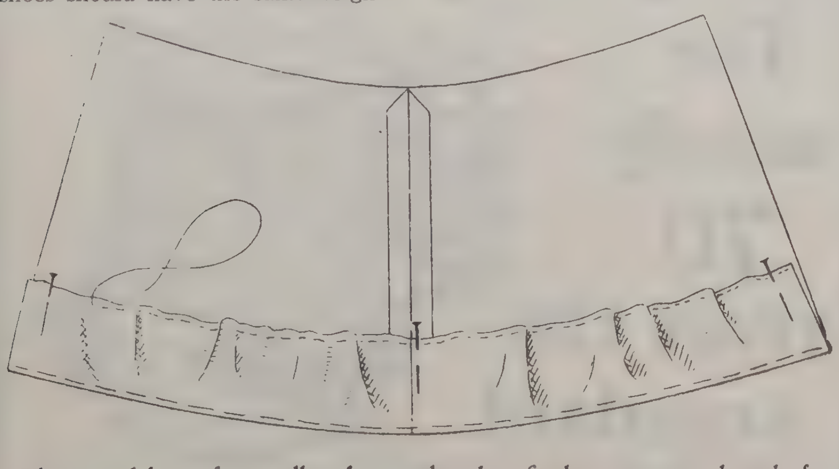
Levelling the Hem

When the garment has been hanging for a time, and the seams are all made and pressed, the hemline may be marked. The garment should be worn with any fastenings closed and any belt adjusted properly. The wearer's shoes should have the same height of heel as those to be worn with the dress. Having a second person mark the hem simplifies the work.

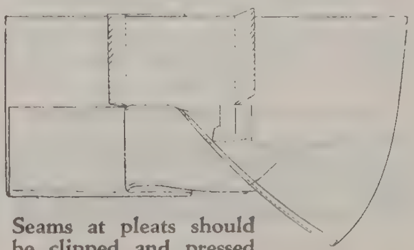
A measuring stand is a convenience and is easily made or may be bought quite cheaply. It leaves the hands free to put in pins to mark the desired level. Failing a measuring stand, a yardstick will serve the purpose, though it is not so easy to handle. When a yardstick is used to level a hem, it is important that the perpendicular distance from a level surface (table or floor) to the hem be measured; the stick must not be allowed to slant. Any straight stick may be used if the required height is marked on it first.

Levelling can be done most conveniently if the wearer stands on a table instead of on the floor. The person measuring has a better view of the hem and does not have to go down on her knees to level the hem. Pins are put in horizontally at the correct level 3 to 4in. apart. If the material is lightweight and the pins tend to fall out, each may be put in and out of the material twice or crossed with another pin.

The person wearing the garment should stand naturally upright. A slight change of posture or the taking of a deep breath will alter the height of the edge of the garment. When the hem level is marked all round, the



The curved hem of a woollen dress gathered to fit the garment and ready for the fullness to be shrunk out. The seam is matched and the gathers are distributed evenly so that they fall at right angles to the hem. The row of basting stitches near the hemline holds the turn-up in position.



Seams at pleats should be clipped and pressed open before the hem is turned up.

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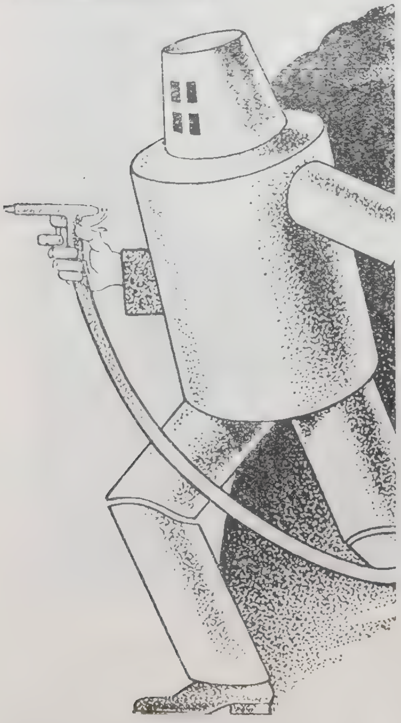

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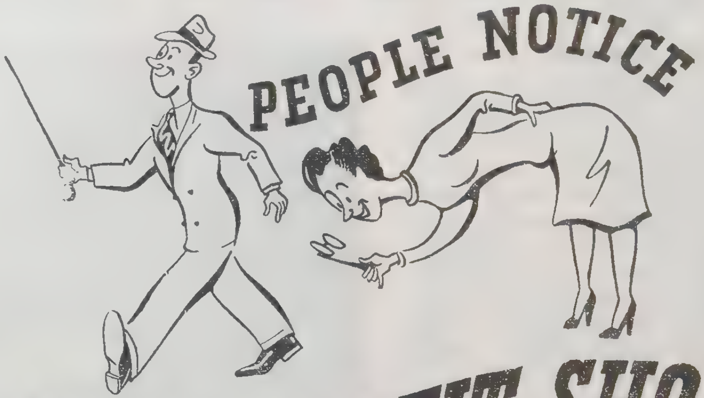

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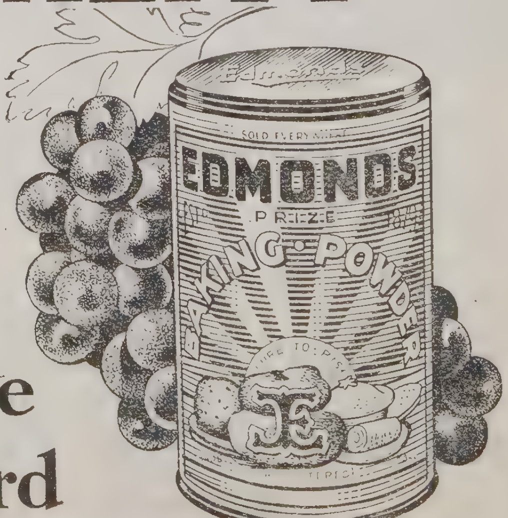

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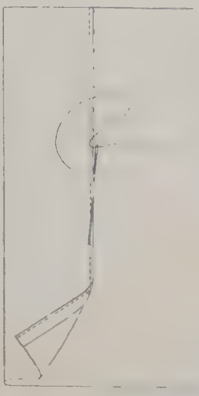
wearer should move round slowly and give a final check against the measuring stick as she turns.

Width of Hem

The style of the garment and the weight and kind of fabric affect the width of the hem, which also may vary with the fashion. The width and the method of finishing the hem must be decided before the lower edge of the skirt is trimmed. Wide hems are used on dresses as a rule, though fashion may decree narrow ones on certain styles from time to time.

For materials of medium weight the hem may be 2 to 3in. wide. If a width of 3in. is chosen, 3¾in. (the ¾in. for a turning) should be left below the marked level and the edge trimmed evenly to this width.

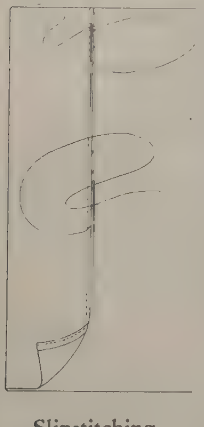


For slipstitching a thread of the under material is taken up just at the edge of the hem and the needle put into the fold of the turning directly above and slipped along in the fold ¼ to ½in. before being brought out on or just under the edge of the fold.

Turning Up

If the garment is pleated, seams at the pleats should be clipped and pressed open for the length which will be covered by the hem.

When a skirt is flared the edge of the hem will need gathering. Use a double thread, starting with a knot and a backstitch, and make a row of gathering stitches along the edge of the hem. If the hem is to be turned in, do the gathering after the turning is made. Turn the hem up into position, matching seams and centre back and front and pinning at these places, placing the pins at right angles to the hem. Then gather the hem edge to fit the garment, distributing the gathers evenly, pin, and baste. Keep the width even all the way round. A long machine stitch may be used for gathering if desired, using the under thread to pull up.



Slipstitching which will not come undone if a thread breaks.

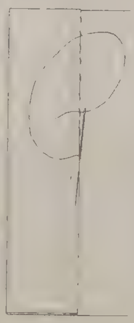
Any fullness in the hem of a woollen garment may be shrunken out. Turn the hem up, gather it to fit, then before stitching it in position place a piece of heavy cardboard between the hem and the garment, and shrink out the gathers by pressing heavily over a damp cloth, moving the iron about. The cardboard between the hem and the garment is essential to prevent the garment being affected by the shrinking process. A line of basting thread run round near the hemline before the shrinking is done is an advantage.

If there is little fullness and the material is stiff, small darts may be used to fit the hem to the garment. Make them at right angles to the edge of the hem and have them all turned to the left for ease in sewing later.

A thick material, whether cotton, rayon, or wool, should not have the edge turned under. If the fabric tends to fray, it must be finished by some other method than turning in. Suitable ways of treating the edge are described.

Types of Hems

Machine-stitched hems may be used if desired on overalls, house dresses, underwear, and children's clothes. Turn in the raw edge, pin the hem in position with pins at right angles to the edge, baste, then sew by machine. Make sure the stitching is an even distance from the edge. Hems on street dresses or woollen garments are not usually machine stitched.



Blind hemming.

Slipstitching is a good stitch to use in sewing hems, for it is inconspicuous on the right side and is quick to do. The thread is covered, so there is less risk of its being broken. The hem can be used on any light or medium-weight fabric, such as most rayons and wool georgette, but not on heavy-weight materials like heavy tweed, where the turning would make the hem too thick. The making of the stitch is illustrated. Do not pull the thread too tight, as that would make the stitching show up too much on the right side. This applies to all hemming stitches. To speed the work, the thread need not be pulled up until two or three stitches have been made. Each stitch may be ¼ to ½in. long. Machine stitching the turned edge before the hem is turned up is an advantage, as it stops any fraying and provides a firm edge. If the hem requires gathering, this row of machine stitching may be used for the gathering.

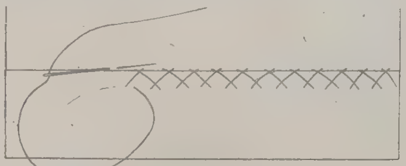
A second type of slipstitching, also illustrated, takes longer to do, but the extra time spent may be worth while if long wear is expected from the garment. Its advantage is that the hem does not come undone if the thread is broken.

Blind hemming is like the well-known plain hemming, which is not suitable for a dress hem, but the stitches are made further apart and not more than one thread of the under material is taken up. The thread is never pulled up tightly.

A bound hem.

A bound hem is used on a thick material, whether the fabric be cotton, rayon, or wool. Commercial bias binding may be used, or bias strips of lightweight fabric of matching colour may be cut. The raw edge of the garment is bound, then the hem is turned up and slipstitched into position.

A catch-stitched hem may be used on thick materials, particularly if the garment is to be lined. The raw edge is not turned in. Begin at the left and work to the right. When covered by a lining the stitches may be made further apart.



Catch-stitching is worked from left to right instead of the usual right to left. Stitches are taken parallel to the edge of the hem alternately in the hem and in the material just above the edge of the hem. The stitches may be ¼ to ½in. apart. Only a thread or two is taken up in each stitch above the hem. The stitches in the hem may go into the two thicknesses if desired, but they must not show on the right side. The threads should not be pulled too tightly.

A faced hem may be used to finish a skirt if the hemline is very curved, so that much gathering would be required, or if the skirt is too short to allow for a hem. The material for the facing need not be the same as the fabric of the garment provided it is of a matching colour. Facings may sometimes be used for decorative purposes on the right sides of garments. When the hemline is curved, the facing is usually best cut to fit, using the bottom of the skirt as a pattern and keeping the straight grain of the fabric in the same position as on the skirt. For a slightly-curved hem a facing cut on the bias is satisfactory, and when the hemline is not curved at all a strip of material cut on the straight makes a satisfactory facing. After joining on the facing, turn it up so that the seam is not seen from the right side of the garment. The edge of the facing may be finished by whichever method of hemming described seems most suitable.

Narrow hems are not often used on dresses or skirts except on sheer fabrics or when they are in fashion for some styles. They may be made up to ¼in. wide, and the stitching may be either blind hemming or slipstitching.

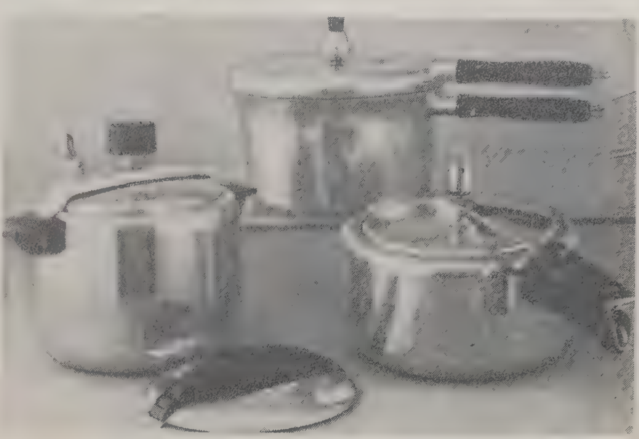
◆

FOODS COOKED IN A PRESSURE SAUCEPA

NUT LOAF
APPLES AND CUSTARD
STEAMED SPICE PUDDING

COOKING WITH A PRESSURE SAUCEPAN

UNDOUBTEDLY the pressure saucepan has come to stay. Heralded as a great time saver, it has proved its worth in homes where cooking meals in a minimum of time is important, and there are few where such a contingency does not arise occasionally—to feed the unexpected guest or, after a day at the local A. and P. show, when the family is impatiently waiting for the dinner to cook or complaining about the unsatisfactory nature of a meal of cold meat and bread and butter. Directions and recipes for preparing a variety of foods which can be cooked in a pressure saucepan are given in this article by Evelyn E. Moore, Rural Sociologist, Department of Agriculture, Palmerston North.



THE value of a pressure saucepan as a time saver in the cooking of ordinary meals is soon appreciated. Though at first it requires more careful watching than an ordinary saucepan, the time thus spent is normally brief, and such habitual tasks as preparing a sauce for a pudding and setting the table can be carried out while the food is cooking. In addition, it brings about a considerable saving of power in homes with electric stoves, and it may be used to cook a wide variety of foods, often producing a better-flavoured and more consistently-good result than can be obtained by ordinary cooking processes.

Now that a greater variety of sizes and shapes of saucepan is available, most housewives should be able to find one suited to their requirements. For example, one manufacturer produces saucepans with capacities of 6, 7½, and 10 pints, and other brands vary in capacity from 6 pints up to the large size which may be used for bottling fruit, holding four or more quart bottles or sufficient food for a meal for a family of eight or ten. However, many women find two smaller saucepans more useful, as foods requiring different cooking times may be cooked separately, the time spent cooling the saucepan, adding the foods requiring less cooking, and reheating being obviated.

Retention of Nutritive Value

Recent investigators have given reassuring reports of the nutritive value of pressure-cooked food, for many experiments have shown that the higher cooking temperature does not cause increased destruction of vitamins B_1 (thiamine) and C, the two vitamins most easily destroyed by heat, during the time vegetables are being cooked. In fact, the pressure-cooked vegetables retained more of these vitamins than boiled vegetables, for less was dissolved in the cooking water. The maximum of other nutrients should also be obtained from pressure-cooked food, as four causes of their loss during cookery—the length of time at the cooking temperature, the use of much water, slow speed of heating to the cooking temperature, and the presence of air—are all greatly reduced.

Though all makes of saucepan are sold with booklets showing how to use them, the recipes and cooking times given are not always suitable for New Zealanders or may contain ingredients which are not obtainable here. On the other hand, many everyday favourites lend themselves well to pressure-saucepan cookery, but are not always to be found in the booklets, nor is it always explained clearly that some foods tend to be more suitable for pressure cooking than others.

In the "Journal" for March, 1948, the principles of pressure cookery and some of the foods for which it is most suitable were discussed. Its value in the cookery of vegetables and meat, which require a quarter of the usual time or less, is well known, but the slightly greater care required in the cooking of other foods has occasionally led to an expression of the opinion that cooking them in a pressure saucepan is a waste of time. Though it is true that many people prefer to use the pressure saucepan for cooking vegetables rather than joints, steamed puddings, or loaves, there may be occasions when it is a boon to be able to cook a successful nut loaf in the saucepan or to provide the family with the traditional hot Christmas pudding when the weather has proved unkind and the anticipated picnic lunch has lost all its attractions.

Following are some suggested recipes for pressure-saucepan cookery and some general directions which may prove useful. All the recipes and cooking times are intended for use at 15lb. pressure, as most saucepans are regulated to cook only at this pressure. If the saucepan has a regulator which enables it to be used at other pressures, instructions for altered cooking times and recommended pressures are included in the booklet supplied with it.

Vegetables

Most of the booklets provided with pressure saucepans give adequate instructions for vegetable cookery. Potatoes may require 15 minutes for complete cooking, and better results are probably obtained by lowering the pressure at room temperature. Potatoes for mashing may be cut in quite small pieces and then cooked for the same time as other vegetables which take from 3 to 6 minutes.

Soups

Like vegetables and meat, soups are very well suited to pressure cookery. Bone stock can be made in 20 minutes, and barley or pea soup will cook as quickly, the full flavour being retained or even enhanced. It is important that the saucepan be not more than half filled and that care be taken in cooling the saucepan, for soup takes longer than other foods to cool, and if the weight or lever is released too quickly, soup may spurt through the opening and be wasted and possibly cause burns. Less liquid is used in pressure-cooked soups, as there is less evaporation.

Vegetable Soup

¾lb. of mixed diced vegetables
¾ pint of water or stock
Seasoning
1 tablespoon of dripping if desired

Melt the fat in the saucepan and fry the vegetables for 5 minutes without browning them. Add the liquid and seasoning and cook the soup at pressure for 3 minutes. Alternatively, cook vegetables and stock for 5 minutes at pressure and reduce pressure quickly by putting the saucepan under the cold tap.

If soup is required quickly, vegetables may be placed in the cooker with soup bones and all cooked for 25 minutes.

Soup Stock

Break 2lb. of stock bones, place them in the saucepan with 2 pints of water and seasoning, bring the saucepan to pressure, and cook the stock for 30 minutes. Cool it slowly.

Meat

The pressure saucepan is at its best for stews and other meat which normally requires very long slow cooking. Cooking time for stews is reduced to about 15 minutes, and delicious ox tail or stewed fowl can be prepared in 25 minutes.

Mutton Stew with Parsley Dumplings

1½lb. of neck mutton chops
2 tablespoons of fat
2 teaspoons of salt
Pepper to taste
3 carrots, quartered
3 or 4 onions
3 stalks of celery, chopped

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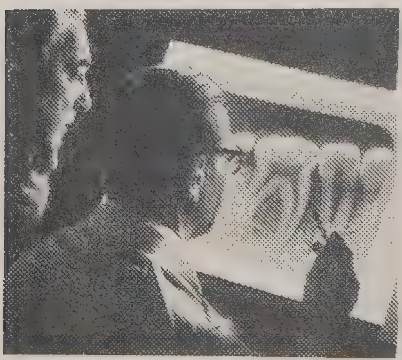

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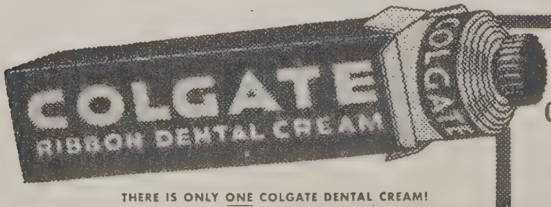

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Trim off excess fat and brown the meat in the fat in the saucepan with salt and pepper; this gives a richer, browner gravy, but the process may be omitted if desired. Add 1½ cups of water, carrots, onions, and celery. Cover them, bring the saucepan to pressure, and cook the stew for 15 minutes.

Dumplings

4oz. of flour
2 level teaspoons of baking powder
½ level teaspoon of salt
1oz. of butter or dripping
About ⅓ cup of milk
2 tablespoons of chopped parsley

Rub the fat into the sifted dry ingredients and mix them to a slightly sticky consistency. Drop the mixture in teaspoonfuls or rolled into small balls into the boiling stew, put on the lid, but do not raise the pressure. Cook the dumplings rapidly for 7 to 10 minutes. They are better cooked without pressure, as they take only 10 minutes or less and are much lighter. Thicken the stew if desired.

Beef Stew and Vegetables

Cut stewing beef into cubes, melt a little fat in the saucepan, and brown the meat and sliced onions without putting on the lid. Add the desired amount of sliced or diced carrots and ½ to 1 cup of water depending on the amount of meat, raise the pressure, and cook them for 10 minutes. Cool the saucepan under the tap, release the pressure, and add potatoes (cut so that only 5 to 6 minutes' pressure cooking is required) and quartered cabbage. Cook the stew for 5 minutes more at pressure, then lower the pressure with cold water again. Remove the potatoes and cabbage and thicken the stew.

If desired, whole potatoes may be put in with the meat and all cooked for 15 minutes at pressure.

Ox-tail Stew

1 ox tail
2 onions
2 carrots
1 stick of celery
1oz. of dripping
1oz. of flour
Seasoning

Prepare the ox tail in the usual way, brown it if desired, and add ¾ pint of water, vegetables, and seasoning. Seal them in the saucepan, bring it to pressure, and cook them for 25 to 30 minutes. Cool the saucepan with water, remove the lid, add the thickening, and boil until the stew is thickened.

Stewed Fowl

Fowl cut into serving pieces
1½ teaspoons of salt
Pepper
1 diced carrot
1 chopped onion
1 stalk of chopped celery
1 or 2 rashers of bacon, chopped

Place the fowl on a rack in the cooker, sprinkle it with salt and pepper, and add the other ingredients with 2½ cups of water. Cook them at pressure for 20 minutes, or 25 to 30 minutes for an old fowl. Allow pressure to drop at room temperature and thicken the stew if desired.

Rabbit can be cooked in the same way. It requires 10 to 20 minutes according to age.

Braised Poultry

A fairly-small fowl or chicken (for a 3-quart saucepan)
2 tablespoons of fat
Stuffing as desired
Seasoning

Prepare the bird in the usual way, removing the legs if necessary to fit it in the saucepan. Brown it with the fat in the pan. Add ½ cup of water and cook the bird on the rack for 20 to 25 minutes.

Tongues

Cover a 3 to 4lb. tongue with cold water and soak it for an hour to remove the salt. Set it in the saucepan on the rack with 3 cups of water and cover it. Allow steam to flow from the vent in a steady stream for about a minute. Raise the pressure and cook the tongue for 1¼ hours after pressure has been reached. Cool the saucepan at room temperature.

Pot roasts, chops, and other cuts of meat may also be cooked successfully in a pressure saucepan. Browning the meat in the saucepan before cooking it improves the flavour and appearance.

Desserts

Baked Custard

½ pint of milk
1 egg
Sugar and flavouring to taste

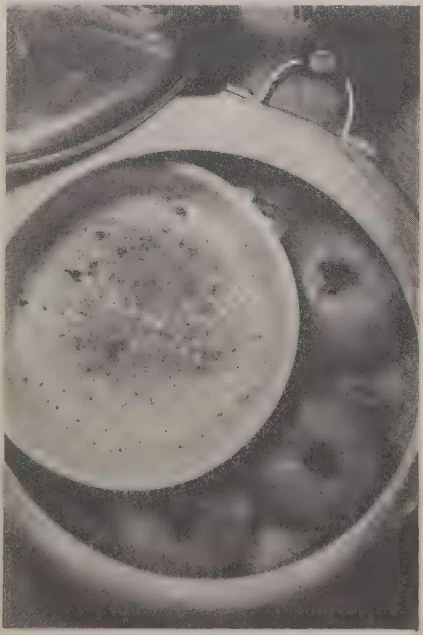
Butter a basin that will fit easily into the saucepan. Make the custard, pour it into the basin, and set in on the rack in the saucepan with ½ cup of water around it. Raise the pressure and cook the custard for 4 minutes. Cool the saucepan quickly with water, open it, and leave the custard for 1 to 2 minutes to set before removing it. A double quantity takes 6 minutes to cook.

Baked Apples and Custard

Baked apples and custard may be cooked together in a pressure saucepan.

Prepare medium-sized apples for baking and stuff them with raisins or dates if desired. Arrange them on the rack in the saucepan around the edges. Seal them, raise the pressure, and cook them for 2 minutes. Cool the saucepan, add the custard in the basin, reseal, raise the pressure, and cook apples and custard for another 4 minutes. If a pint of custard is made, all can be cooked together for 6 minutes.

The apples are not browned, but in other ways they are like baked apples.



[Sparrow Industrial Pictures Ltd. photo.
Baked custard and apples cooked together in a pressure saucepan. The apples are not browned but in other ways they are like baked apples.

Stewed Fruits

Though soft and ripe fruits do not require the rapid cooking of a pressure cooker, there are others for which it can be used with a saving of time and often with better results. For example, dried fruits, or very hard pears or peaches which normally require long cooking, can be stewed in 5 or 6 minutes in a pressure saucepan. All booklets do not give cooking times for fruits, and the following times are suggested:

Sliced apples ..	2 minutes
Apple puree	5 minutes
Stewed pears ..	5 to 6 minutes (8 if hard)
Stewed peaches ..	5 to 6 minutes
Stewed apricots ..	2 to 3 minutes
Stewed gooseberries	2 minutes
Gooseberry puree ..	4 minutes
Rhubarb	2 minutes

Dried Fruits

Soaking for an hour in warm water before they are cooked makes dried fruits plumper and juicier. Then they require the following cooking times at pressure:

Pears, apples, and peaches ..	5 to 6 minutes
Apricots	1 to 2 minutes
Figs	12 to 15 minutes
Prunes	8 to 10 minutes

Steamed Puddings, Breads, and Suet Puddings

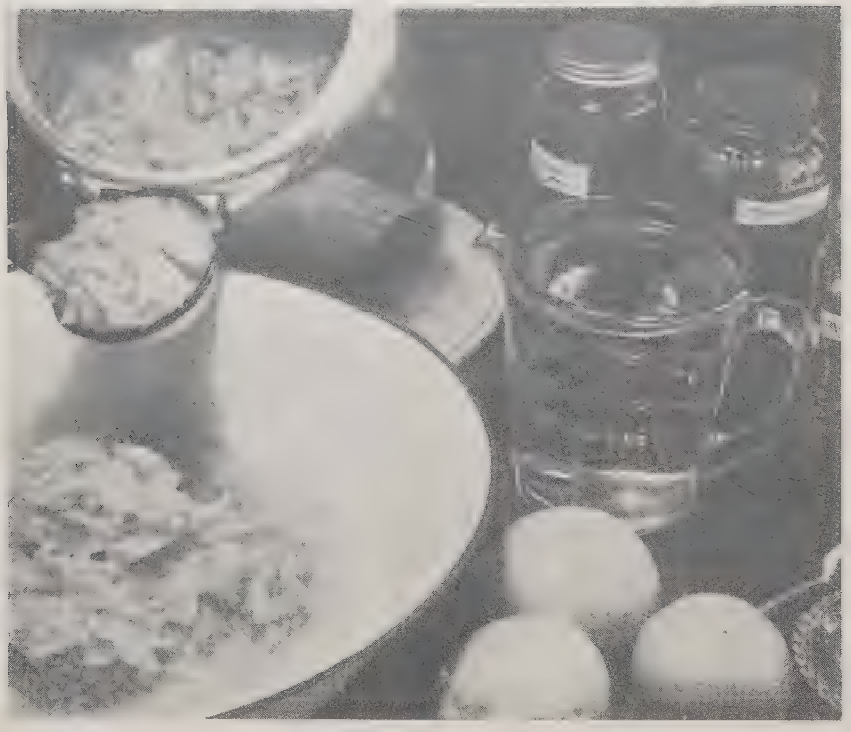
For cooking in a pressure saucepan, steamed puddings, breads, and suet puddings are improved by being steamed for 10 to 20 minutes before the pressure is raised. Though all steam puddings can be made successfully in a pressure saucepan, often they are not quite as light as ordinary steamed puddings, and ones in which breadcrumbs are substituted for part of the flour usually are lighter than those containing flour only. Rich fruit puddings and suet puddings cook comparatively quickly and turn out better than sponge puddings, in the cooking of which little time is saved. The pudding should be well covered and the cloth or two layers of greased paper tied down firmly.

Steamed Fruit Pudding

3/8 cup of finely-chopped suet
½ cup of treacle
½ cup of raisins
¼ cup of currants
¼ cup of candied peel
½ cup of milk
1¼ cups of flour
¼ teaspoon of baking soda
1½ teaspoons of baking powder
¼ teaspoon of salt
¼ teaspoon of nutmeg
¼ teaspoon of cinnamon

Sift the dry ingredients twice. Mix in the other ingredients, pour the mixture into buttered moulds, and cover it tightly. Place the moulds on the rack in the cooker with 3 cups of boiling water. Steam the pudding without pressure for 10 minutes and with pressure for 20 minutes.

RECIPES FOR PRESSURE COOKING



[*Sparrow Industrial Pictures Ltd. photo.*

A pressure saucepan is a useful adjunct in the making of jam or marmalade. In 15 minutes oranges or grapefruit can be cooked ready for the addition of of extra water and the sugar.

Coffee Pudding

- 2oz. of breadcrumbs
- 2oz. of fat
- ¼ pint of strong coffee, or 2 teaspoons of coffee essence and ½ cup of water or milk
- 4oz. of flour
- 2 teaspoons of baking powder
- 2oz. of sugar
- A few drops of vanilla essence

Rub the fat into the flour and add the baking powder, crumbs, and sugar. Mix them with the coffee and vanilla essence and put the mixture into a greased basin. Stand the basin on the rack in the cooker in 2 pints of boiling water and cover it well. Secure the lid and steam the pudding with the pressure valve up or the weight off for 20 minutes and at pressure for 20 minutes. Reduce pressure at once under the cold tap.

Spice Pudding

- 4oz. of raisins
- 4oz. of sultanas
- 1 teaspoon of mixed spice
- ½ teaspoon of cinnamon
- ½ teaspoon of nutmeg
- 1 egg
- 1 teaspoon of baking powder
- 3oz. of breadcrumbs
- 3oz. of suet or dripping
- 3oz. of flour
- 2oz. of sugar
- Milk to mix

Rub the fat into the sifted dry ingredients, or add the suet. Add the breadcrumbs, egg, and sufficient milk to make a sticky mixture. Put it in a greased basin and cover it well. Cook it for 20 minutes without pressure and 30 minutes with pressure.

Nut Loaf

- 2 cups of sifted flour
- ½ level teaspoon of baking soda
- 1 cup of raisins
- ½ cup of golden syrup
- 1 cup of bran or rolled oats
- About 1 cup of milk
- 5 level teaspoons of baking powder
- ½ teaspoon of salt
- ¾ cup of chopped nuts
- ½ cup of sugar

Mix the dry ingredients and add the raisins, nuts, and sugar. Dissolve the syrup in most of the milk and mix all the ingredients to a soft consistency. Add extra milk if required. Two-thirds fill tins with the mixture and steam it in the saucepan with 2 pints of boiling water for 20 minutes without pressure and 25 minutes with the pressure raised. These quantities make two medium-sized loaves.

Christmas Pudding

- 4oz. of breadcrumbs
- 2oz. of flour
- 3oz. of shredded suet
- 3oz. of brown sugar
- 1 small grated carrot
- 1 teaspoon of mixed spice
- 1 teaspoon of almond essence
- 1 small grated apple
- 1lb. of mixed dried fruits
- 1oz. of peel
- 1 tablespoon of treacle or syrup
- 1 teaspoon of cinnamon
- 2 eggs
- Spirits, or 8 tablespoons of ale or wine
- 1 teaspoon of vanilla essence
- 1 teaspoon of lemon essence

Mix all the ingredients together, put them into one or two greased basins, and cover them well. Put the basins on the rack in the cooker in 2½ pints of boiling water, secure the lid, and steam them for 30 minutes. Raise the pressure to 15lb., lower the heat, and cook the pudding for 1½ hours. Reduce pressure at once under the cold tap.

Apple Pudding

- 8oz. of flour
- ½ teaspoon of salt
- 2 to 4oz. of suet
- 2 teaspoons of baking powder

Sift the dry ingredients, add the finely-chopped suet, and mix them to a stiff dough with water. Roll out the pastry and line a greased basin with part of it.

Peel, core, and slice the apples and put them into the pastry with a good sprinkling of sugar and enough water to cover half the fruit. Roll out the rest of the dough to form a cover. Damp the edges of the pastry lid and press it on to the pudding. Cover the basin well and stand it on the rack in the cooker in 2 pints of boiling water. Steam the pudding without pressure for 30 minutes, raise the pressure and steam it for a further 30 minutes, and reduce pressure immediately under the cold tap.

Jams and Pickles

A pressure saucepan may be used to reduce the preliminary time spent cooking fruits for jam and marmalade. Soft fruits such as black currants and gooseberries are cooked in 2 or 3 minutes and other fruits in correspondingly less time. The saucepan should not be more than half full.

Black Currant Jam

Put 1lb. of black currants and 1 cup of water into the saucepan. Secure the lid, bring the saucepan to pressure, and cook the fruit for 3 minutes. Cool it, remove the lid, add 1¼lb. of sugar, and when it is dissolved boil the jam rapidly without the lid until it will set when tested.

Marmalade

Slice 6 grapefruit or marmalade oranges (about 2lb.) and cook them in 2 cups of water at pressure for 10 to 15 minutes, depending on the age of the fruit. Cool the saucepan at room temperature and add another 4 pints of water. Add 1 cup of sugar for each cup of fruit and liquid. Boil the marmalade in a preserving pan, or in the pressure saucepan without the lid, until it will set when tested.

Green Tomato Pickles

- 4lb. of thinly-sliced green tomatoes
- ½lb. of thinly-sliced onions
- ½ cup of salt
- ½ tablespoon of mustard
- 1 tablespoon of cloves
- 1 tablespoon of pickling spice
- 1 cup of vinegar
- ½ cup of firmly-packed brown sugar

Place alternate layers of tomatoes, onions, and salt in a bowl and stand them over night. Drain them, add the remaining ingredients, and cook the pickle for 20 minutes at pressure. Pour it into hot sterilised jars and seal them. These quantities make 2½ pints.

Preserving Vegetables

Peas or beans may be preserved successfully in a pressure saucepan in 1lb. jam jars with sealing skin or in pint preserving jars. Pack peas or beans in hot jars, fill them to within ½in. of the top with boiling salted water (about ½ teaspoon of salt to a 1lb. jar), and place them in the saucepan. Most makes of saucepan will hold three 1lb. jam jars. Cook beans for 25 minutes at pressure and peas for 35 minutes.

Raising and lowering the pressure gradually is advisable to prevent the jars cracking and to ensure that when the skin balloons up during cooking it will not block the control valve.

The Museums of New Zealand

THE growth of museums from small private collections to the great modern institutions which house the world's art treasures, antiquities, rare manuscripts, and articles of great historical significance has developed mainly since the Middle Ages. Along with the Press, radio, and libraries, the museum today is a distributing agent of information and a means of advancing knowledge. New Zealand museums, though not possessing the comprehensive range of exhibits displayed in the well-known metropolitan museums of Europe and America, perform an important function in furthering child and adolescent education and undertaking field research. This article by Enid B. V. Phillips is the first of a series describing the museums of New Zealand, which range from the small-town museum of parochial interest to the four metropolitan museums, which cater for the national interest. In this article she outlines the development of museums generally and deals with the work of the Dominion Museum, Wellington; next month the Otago and Canterbury Museums will be described.

THE distinction of collecting the natural history objects and archaeological curiosities which eventually led to the formation of the first museum in the British Empire belonged to John Tradescant, gardener to Charles I. Tradescant is credited with the earliest account extant of Russian plants and he introduced the Algier apricot into England, having brought it back on one of his voyages. His fame as a horticulturist even extended as far afield as the New World, for a genus of American perennial herbs, the spiderworts, was named after him, and his enthusiasm for natural history and his love of travel were shared by the son who succeeded him. In fact, in the course of their journeyings these two intrepid travellers accumulated so many rarities that they were prevailed upon to exhibit them publicly in London.

John Tradescant the younger, who survived his father by some 25 years and died in 1662, bequeathed the entire collection to his lifelong friend Elias Ashmole, the Lichfield solicitor who left his law books to become a Captain of the Horse in the Royalist cause and whose studies at Oxford in after years earned him high honours. It was certainly an appropriate action on the part of the scholarly Ashmole, an antiquary of note and an authority on heraldry (his magnum opus, "History of the Order of the Garter," was published in 1672), to present the collection Tradescantianum to the university with which he had had such a long and happy association. A special building was erected to house the gift and so in 1679 the Ashmolean Museum, the first in Great Britain, came into being.

"Temple of the Muses"

Although the word "museum" is derived from the ancient Greek and means "temple of the Muses," the modern museum had no real counterpart in classical times, Ptolemy's Museum at Alexandria (which was founded about 300 B.C.) being a university centre for the benefit of the learned and not for the general community. During the Middle Ages art collections and the like were confined to a comparatively small number of churches and monastries, museums in the modern sense being an offshoot of the Renaissance, that remarkable revival of the tree of knowledge from whose ancient boughs burgeoned a new glory of art and literature, a new love of learning, and, fairest flowers of all, finer ideals of life.

As men's interest in the wisdom of the classics increased so did their desire to know more concerning the relics of antiquity and thus commenced the collection of rare and curious objects by private individuals. In the 16th and 17th centuries this was for the most part carried out by princes and nobles, and many of the great European museums owe their origin to these collections.

British Museum's Auspicious Start

The nucleus of the British Museum, founded in 1750 in Bloomsbury, London, was formed by the Arundel MSS., a portion of the collection begun by Thomas Howard, second Earl of Oxford, in 1615 (the Arundel marbles today grace the Ashmolean Museum); the wealth of books and papers belonging to his contemporary, the antiquary Sir Robert Cotton, whose temerity in criticising Royalty cost him both his liberty and his library, the library being subsequently restored to his heir and later being presented to the nation by his great-grandson, Sir John Cotton; the books and MSS. amassed by Robert Harley, Earl of Oxford, and his son Edward, companion and correspondent of Pope and Swift; the prints, pictures, coins, and natural history specimens collected by the Scottish naturalist Sir Hans Sloane (at one time physician to the Governor of Jamaica and President of the Royal Society of Physicians for 16 years); and, last, the library of George II. With such an auspicious start it is small wonder that today the British Museum possesses the biggest library of printed books in existence and still remains the Mecca of research students.

The establishment of municipal museums mostly took place during the 19th century, and the public's ever-growing interest in education led to the development of different types of museums specialising in particular branches of knowledge according to the nature of their contents. Thus, in addition to the great art museums, much more numerous on the Continent than in England, there are museums of ornamental art, illustrating the history of art as applied in the case of crafts connected with decoration and design such as the manufacture of ceramics and

[*George Weigel photo.*

An important part of museum work is the teaching of children by the use of exhibits.

enamels, fine furniture and metalwork, textiles and tapestries, etc. Berlin and Vienna have collections of "untold richness;" the Uffizi Gallery, founded by the Medici, is famed for its historical tapestries and the chronological display of Italian paintings dating from the 14th to the 16th century, while the Louvre, Paris, formerly the palace of the Kings of France, holds the largest collection of art in the world.

Hamburg, Vienna, and Leipzig offer excellent examples of the industrial arts, as does the Victoria and Albert Museum, London, where Beatrix Potter, that beloved children's author, used to repair with sketch pad and pencil to obtain inspiration from the 18th century costumes in the showcases for her drawings of those gorgeously-coloured creations, the beflowered waistcoats embroidered by the little mice which she depicts in such exquisitely-fine detail in her favourite book, "The Tailor of Gloucester."

At Zurich, Switzerland has set the standard for exhibits showing the different types of architecture, furniture, and modes of living in vogue at various periods of the world's progress, and similar methods of arrangement have been adopted with advantage by the National Museum at Munich. Ecclesiastical art is among the chief attractions of the national collections at Amsterdam, and Oriental art is typified by the Imperial Household Museum, Tokio.

Swedish Domestic Art Museum

Domestic art is far from being despised in Sweden; on the contrary, it is deemed sufficiently important for its capital to devote one of its three museums almost completely to this Cinderella of the arts. Stockholm, too, is the original home of the open-air museum, one of the hillsides overlooking the city being permanently occupied by the peasant cottages, barns, church belfries, and windmills of a traditional Swedish farming community. Authentic furnishings, farmcarts, and implements add to the charms of this peaceful rural scene and periodic displays of country dances, games, and other pastimes keep the folklore of former days from being forgotten.

The idea has been copied in other countries, too, and at Williamsburg, Virginia, America has preserved a colonial town in entirety, even to the 17th century roads, and New Zealand has followed suit in regard to the Maori stronghold situated near Whakarewarewa, Rotorua, with its carved meeting-house and canoe memorials and its picturesque native dwellings and patakas (storehouses) enclosed by trench and palisade, as was the old Maori custom in constructing a pa.

So the classification of museums continues: There are museums of comparative anatomy and museums commemorating the life and work of some famous person (Shakespeare at Stratford-on-Avon, Beethoven at Bonn, Durer at Nuremberg, etc.); war museums and museums of whaling; museums of practical geology and a museum which is in reality one of the earliest Belgian printing establishments; museums of science and industry and museums of archaeology (surprisingly, the Scandinavian countries seem to specialise in both, Copenhagen's collection of antiquities being world famous); maritime museums and museums showing the evolution of man-made objects; a museum of Eastern religions (a French institution); and even an earthquake museum, a Japanese memorial of the dreadful disaster which razed Yokohama in 1923, and whose Dantesque dioramas and gruesome relics cause even the most stout-hearted sightseer to flinch.

Museums of natural history are legion, especially in the United States of America, where the citizens are decidedly museum minded. There are 110 museums in New York City alone. The Peabody Museum, at Yale University, New Haven, possesses the first birds with teeth to be discovered and important examples of primitive horses. The Field Museum of Natural History, in Chicago, is foremost in botanical exhibits and has the largest collection of meteorities in the world. In the division devoted to human life and culture is featured a series of bronze statuary characteristic of the various races, the sculptor Malvena Hoffman having been sent on a world tour to carry out her commission as realistically as possible.

Claim to Distinction

Unique reproductions of invertebrates, modelled in glass and delicately tinted, and a greater display of complete skeletons of dinosaurs and other extinct animals than that of any other similar institution give the American Museum of Natural History, New York, a definite claim to distinction, as does its palatial Hall of Pacific Birds, which depicts the bird life of every island and country of the Pacific. This museum, too, like the Smithsonian Institution, Washington (named after the British scientist who left such a liberal legacy for its foundation), and others, undertakes extensive research work and sends out scientific expeditions not only to secure suitable specimens, the basic material which builds up museum collections, but to study their subject matter in its natural setting and so obtain their facts first hand.

The camera plays an important part in recording these facts, and the colour film made by the Bishop Museum, of Honolulu, on a recent expedition to Kapingamarangi, a tiny atoll in the central Carolines, to learn about the customs and living conditions of the Polynesian community there is a case in point which proves that films form a first-class medium for disseminating information, this being the main function of a museum.

One of the outstanding developments of museum services in recent years has been in connection with juvenile education, the tendency toward the use of visual aids resulting in the extended demand on museums in America, England, and the British Commonwealth for teaching material. Though far from the world's famous centres of culture and with a relatively sparse population in comparison with other countries, New

Zealand has not lagged behind where modern educational methods are concerned. As long ago as 1917 children in Wellington could attend classes in entomology at the Dominion Museum, and the request for lecture-demonstrations on Maori lore, devised by that eminent scholar Elsdon Best, assisted by Miss Amy Castle, and subsequently developed by W. J. Phillipps, who is an authority on New Zealand fishes as well as Maori art, so exceeded the segment of time which was all the museum staff could spare without neglecting their other duties that the necessity for full-time educational officers to be attached to the four metropolitan museums in New Zealand was obvious. (Both the Otago museum and the Canterbury Museum encouraged the visits of school classes, and the Auckland Museum had been ambitious enough to add field work and semi-scientific clubs to its educational experiments.)

The old Dominion Museum, which was situated in Sydney Street, Wellington.

"Old-time Voyage of Discovery"

This was made possible by the generous grant given by the Carnegie Corporation of New York in 1937 for the extension of museum work in New Zealand, thus enabling primary and secondary school pupils to flock to the museums in ever-increasing numbers and make the fullest possible use of the many facilities offered. Even the least studiously inclined child cannot fail to find a lecture entertaining when it is illustrated by a film, and lessons in nature study, history, geography, sociology, and the like take on all the excitement of an old-time voyage of discovery when youngsters are given instruction sheets and pencils and permitted to explore the galleries themselves in search of the "clues" (usually inscribed on cards in true treasure-hunt style) that will supply the necessary information to enable them to make their own notes and sketches of the exhibits connected with their particular line of study.

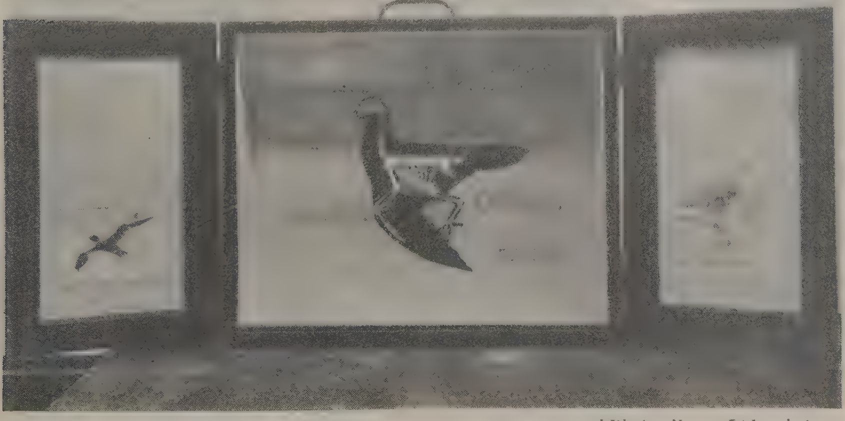
The student teachers in charge of these groups are stationed at the museum for a 6-weeks training course in the use of museum material, approximately 50 student teachers a year at each of the four principal museums receiving tuition in all the main departments of museum work—a most estimable undertaking and one of exceptional benefit to the teachers themselves as well as the pupils who pass through their charge.

Not only do the children "learn by looking," as the Director of the Dominion Museum so aptly phrased it, but they are allowed to handle many of the articles in the show cases. What joy to stroke the soft plumage of the beautiful seabirds the instructor has been describing; to trace with a finger the intricate pattern of some ancient piece of carving; to feel the texture of a silky-fine cloak of native weaving; to hold some rare ornament of jade or porcelain to appreciate its beauty of form and colour better. Just imagine the thrill it is to schoolboys whose imaginations have been stirred by the epic story of Captain Scott's explorations in the Antarctic to be allowed to touch the Nansen cookers, an essential part of the equipment their hero took with him on that last expedition to the South Pole and which are now in the possession of Canterbury Museum.

Museum Clubs for Children

Moreover, the child with a particular aptitude for botany is invited to link up with a museum club and take part in plant-hunting excursions, or if he wishes to learn Maori weaving or study the sun and stars or increase his knowledge of animals or insects or some other special topic of interest, there is a club to cater for his needs. In fact, one museum even went so far as to install fish tanks and other receptacles in its backyard so that budding naturalists could have a suitable place in which to keep their current acquisitions of frogs, lizards, ants, and other cherished livestock.

When country schools cannot visit the museum because of transport difficulties the museum exhibits are taken to the classroom by means of specially-constructed cases with dividing doors opening out to form two panels of illustrative and descriptive matter flanking the central exhibit. City schools, too, can share in these circulating collections, the cases being exchanged at fortnightly intervals. Birds lend themselves admirably to this type of exhibit and so do butterflies and bees, and requests for portable displays may range from the life history of a white butterfly to the story of whales and the New Zealand whaling industry or from the traditional Maori methods of tree felling to the latest processes in the refining of sugar. Last year in the Auckland Province alone 55 town schools and 137 country schools availed themselves of these circulating cases and many more are eager to participate in the scheme as soon as



[*Photo News Ltd. photo.*

A specially-constructed case containing an exhibit for circulating among schools.

[Photo News Ltd. photo.

Part of the Elgar bequest to the Dominion Museum of period furniture. The chair is of William and Mary period and the couch Regency.

the supply of loan material becomes sufficient for them to do so. The attendances of children at the museum for 1-hour lessons over that same period totalled 29,031 despite the fact that the schools were closed most of the first term because of the polio epidemic.

School Collections

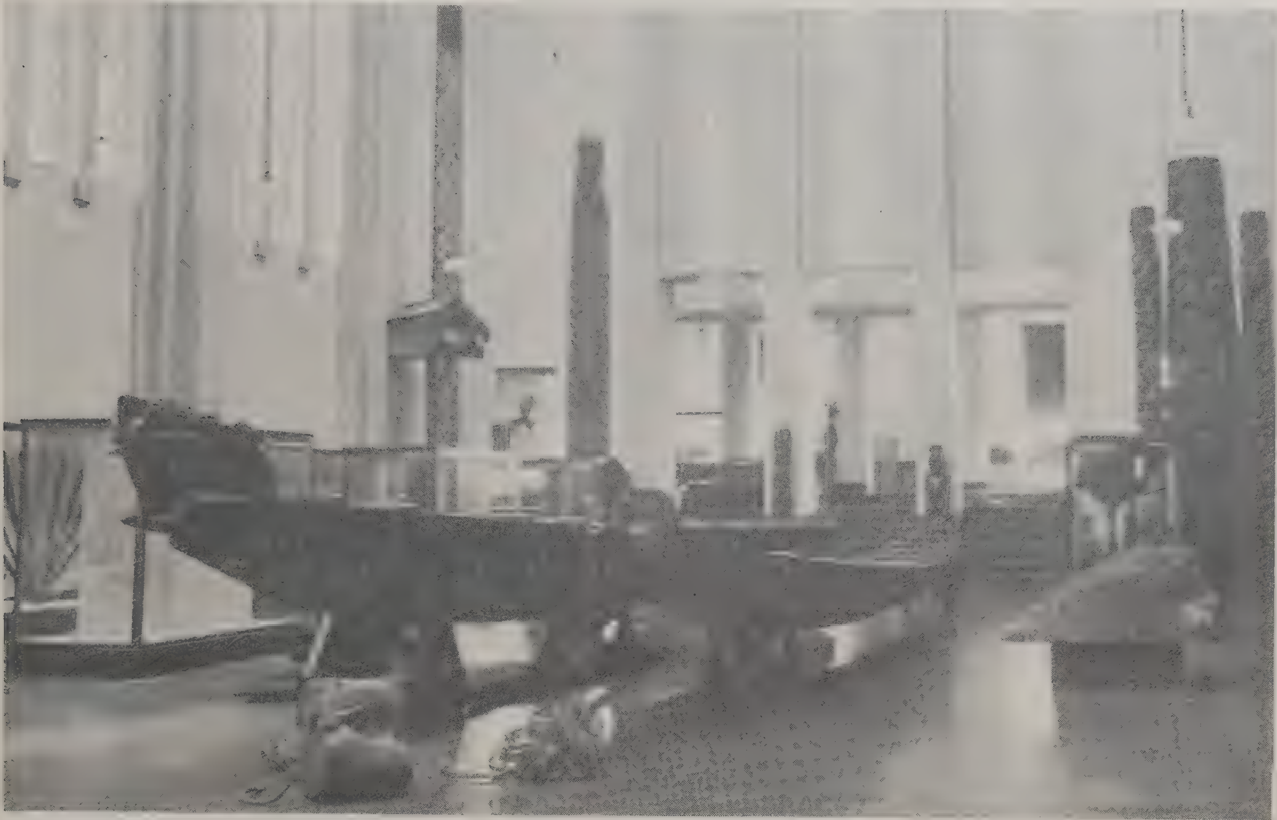
Quite a number of schools have small museums of their own; the Correspondence School, Wellington, whose pupils are scattered in all corners of the country, is to be particularly commended in this respect. The collections at both the Hutt Valley High School and Wellington College were at one stage arranged by Thomas Grant-Taylor, grandson of the late T. F. Cheeseman, the distinguished botanist who was Curator of the Auckland Institute and Museum for half a century. The only school museum in New Zealand to be open regularly to the public belongs to the Masterton Central School and was founded in 1911 by the Masterton Trust Lands Trust, which presented the school with the former Post Office for the purpose of housing the collections. This old three-roomed wooden building, now in the school grounds, still serves in that capacity today, the honorary curator being R. J. Coddington. A number of specimens as well as show cases were the gift of W. H. Jackson, who was in charge of the museum for many years. No less than seven stuffed huias preside over the natural history section, which includes sundry crocodiles, a two-headed calf, and a collection of 84 different grasses. Among the coins are a John o' Gaunt halfpenny (this fifth son of Edward III was nicknamed after his birthplace, Ghent (Gaunt), and became the princely protector of the reformer John Wycliffe); a Queen Elizabeth sixpence; a George II half-farthing; a George III twopence; a Hibernian penny and a halfpenny; a St. Patrick's penny dated 1792; a set of Kruger coins from a sovereign to a penny; a silver fourpence, 1836; a half-farthing, 1847; a Papal 10 soldi, 1867; and 6 Roman coins.

The Dominion Museum

School museums can supplement their exhibits by displays lent from a metropolitan museum. Though unfortunately the Dominion Museum, Wellington, was closed to the public during the war, when it was used by the defence authorities as an administration centre, the work of the education section has gone on continuously. The National Art Gallery, which occupies the top floor of the building, has been restored to its former role and was officially reopened recently, and it is expected that this month the public will once again be free to wander through the various halls of the museum and admire such old favourites as the model of a Maori warrior which used to grace the museum in Sydney Street; the elaborately carved meeting-house from the Orakaiapu Pa, the principal pa in the Poverty Bay district, whence in 1769 the warriors marched to Turanganui in a vain attempt to take possession of Captain Cook's ship, the Endeavour, which was anchored in the bay; the Spanish morion (a helmet without a facepiece) which was found in Wellington Harbour; the insect collection, the largest in New Zealand; the herbaria of such well-known botanists as Thomas Kirk, L. Cockayne, and D. Petrie; the kauri gum collection made by the late F. O. Peat in the far north, mostly in the Dargaville district, and at one time displayed in the "Treasure House" at Titirangi; the ever-popular technological exhibits "The Products of Coal," "The Products of Petroleum," and "The Story of Iron." New exhibits include the Elgar bequest of period furniture; a choice selection of tikis and other examples of Maori arts and crafts; a step carving for one type of storehouse and frontal carvings for

[Photo News Ltd. photo.

The elaborate French secretaire and embroidered silk screen in the office of Dr. R. A. Falla, Director of the Dominion Museum.



[Photo News Ltd. photo.

The Maori Hall of the Dominion Museum, showing a war canoe (left) and a fishing canoe (right), with the mooring stone of Kupe (the famous Polynesian explorer) in front.

another; and a selection of Maori figures from ancient stockades. (In restoring and re-erecting these latter items the museum staff miss the services of the late Thomas Heberley, a Picton harbourmaster's son who came to Petone at a youthful age to learn carving from his uncle and proved so proficient at the art that he plied it all his life and was appointed Maori carver to the Dominion Museum.)

Work on Oldman Collection

The classifying and cataloguing of the Oldman collection of Maori artifacts recently purchased by the Government, and the most valuable collection of its kind in the world, is proceeding apace. Much careful preparation has gone into the modelling of flowers and foliage from plastic so that native birds may be displayed in a more natural setting—honey-eaters like the tui, for instance, will be shown perching on a bough of kowhai or rata instead of a bare wooden stand.

Wellington's museum, which commenced life in 1865 as the Colonial Museum, was founded by the New Zealand Government under the direction of Dr. James Hector, discoverer of the picturesquely-named Kicking Horse Pass in the central Canadian Rockies and Director of the Geological Survey in New Zealand; when the country attained the status of a Dominion in 1906 the title of the museum was altered accordingly.

Hampered by Lack of Space

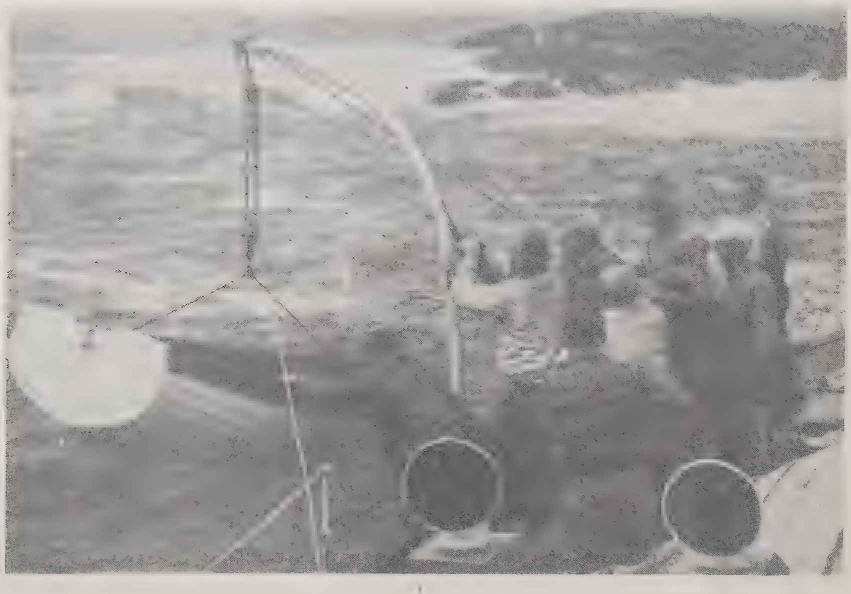
The museum has suffered other setbacks than those occasioned by the war, shortage of space seriously hampering its activities in days gone by. The original building, a wooden structure in Sydney Street that was started in 1865 and completed in 1874, was doubtless big enough to begin with, but during the ensuing years the collections (which dated from 1851, when the New Zealand Society was founded) expanded to such an extent that all sorts of buildings had to be called into requisition as repositories. A large portion of the exhibits was placed in storage, the national war collection being housed in huts at the Trentham Military Camp, some 20 miles from Wellington. However, the public were still permitted to view the major part of the Maori collections, which were stored in an iron shed in the city.

It must have been a red-letter day for the authorities when they moved into the three-storied building with its spacious galleries, lecture hall, library, and work rooms, which had been erected on Mt. Cook. Here on a clear summer morning when the sounds of the city are subdued to a distant murmur and you stand at the foot of the museum site by the peaceful pool and gaze up at the tall campanile of the carillon (Wellington's war memorial to her gallant dead), its copper-covered tower weathered to a soft sea-green, you sense an elusive resemblance to the sun-warmed square of St. Mark, in Venice.

Gracious Setting

The illusion swiftly vanishes the instant you start to ascend the semicircular sweep of the drive where stately cabbage trees stand sentinel amid the border thickets of manuka, matipo, pittosporum, and pohutukawa and the birds fly down to drink the honey from the flax flowers and the koromikos drop their tassels of purple and puce and palest lavender on the path at your feet. Or perhaps you prefer to climb the 99 steps cut through the centre of the hillside and leading directly from the carillon to the curve of the terrace fronting the museum, whence you can look out over the city to the shining waters of the harbour and the blue haze of the Tararua Ranges beyond.

As you approach the wide porch with its fluted columns and flowerlike bosses studding the facade overhead the sun strikes the tiny grains of schist in the graceful concrete urns standing one on each side of the entrance and turns them to sparkling silver. To pass through those great doors, massive as though they belonged to a medieval castle, is momentarily like entering the green gloom of a forest.



[A. J. Black photo.

A scientific expedition at the Snares Islands.

Keen Ornithologists

In the far corner of the Director's sanctum an elaborate French secretaire adorned with ormolu and oval miniatures painted in coloured enamels offers a sharp contrast to the modern office-style desk from which Dr. R. A. Falla directs the activities of the museum. By the door stands a screen of turquoise silk embroidered with typical Japanese artistry with feathery grasses, slender bamboos, and a flight of geese; another panel depicts cranes and waterfowl disporting themselves upon a lotus pond. This screen is a rather exotic touch in an otherwise austere room, but is singularly appropriate in view of the present occupant's interest in birds. Both Dr. Falla and his predecessor, Dr. W. R. B. Oliver, are keen ornithologists, and discount the discomforts and sometimes dangers attendant upon zoological expeditions. (Dr. Falla, for example, was a member of the British-Australian-New Zealand research expedition to the Polar regions in 1929-1931, led by Sir Douglas Mawson, of Australia; and during the last 30 years Dr. Oliver's explorations have taken him to Tahiti, Lord Howe Island, the Chathams, the sub-Antarctic islands, Tasmania, and many parts of Australia and New Zealand, and he also took part in the Kermadec Islands expedition which camped for 10 months on Sunday Island in 1908. Dr. Oliver's text book "New Zealand Birds" has become a classic in our country.) Sailing in a small craft across desolate seas to some outlying island solitude whose rocky shores are so exposed that they afford no safe anchorage whatsoever, so that if a sudden storm blows up there is risk of the shore party being cut off from the supply ship, and being marooned for a considerable period until the waters become calmer and camping in the wilds under the most primitive conditions are hardships the scientist cheerfully accepts as part of the day's work in his search for rare specimens of fauna and flora.

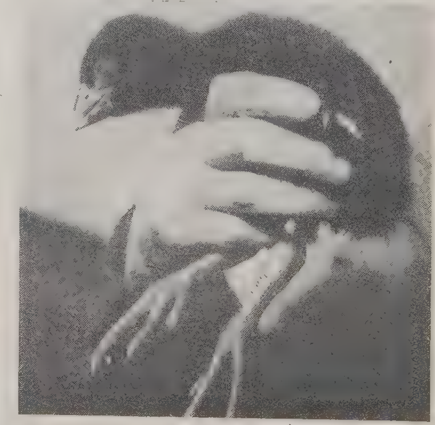
Dr Falla received high commendation from Dr. Robert C. Murphy, Dean of the Department of Birds in the American Museum of Natural History, on the 1947 expedition he conducted to the Snares, that lonely group of islands south of Stewart Island abounding in seabirds, seals, and an especially sticky sort of mud. Even though fern fronds were used for tent floors and the camp paths were paved with great branches, the mud still seeped its way through and high boots became an essential item of the party's attire; for as Mrs. Murphy, who accompanied her husband on this, as on many other of his expeditions, remarked, "We squelched and slipped and fell in mud!" Incidentally Dr. Murphy's museum now has three New Zealand area groups in the Pacific Birds Hall and the result of his most recent trip is a colour film of New Zealand wild life and a model of a typical West Coast bush region as it appeared 500 years ago and having an abundant variety of birds.

[National Publicity Studios photo.

Dr. and Mrs. R. C. Murphy, visitors from the American Museum of Natural History, examining a penguin during a field trip.

Value of Field Research

Field research is an integral part of museum work, and the larger museums of the Dominion have sponsored numerous botanical and zoological expeditions, particularly in regard to ancient Maori camp sites and deposits of moa bones in various localities. A great deal of the valuable information thus gained has been published in book form, greatly enriching scientific literature. That enthusiasm for field research is not confined to museum personnel has been shown by the patient studies of the penguin colonies carried out by L. E. Richdale, of Dunedin, and the carefully-organised investigations of Dr. G. B. Orbell, of Invercargill, which culminated in the important discovery in the high country west of Lake Te Anau of the notornis, a bird believed to be extinct, as it had not been sighted since the 1890's. Museum officers are being given every opportunity to study this remarkable "contemporary of the moa," of which there were only four specimens in existence, two being in the British Museum, the third in the Dresden Museum (though it probably suffered the same fate as most of the museum's collection, which was destroyed in the bombing raids during the war), and the fourth in the proud possession of the Otago Museum.

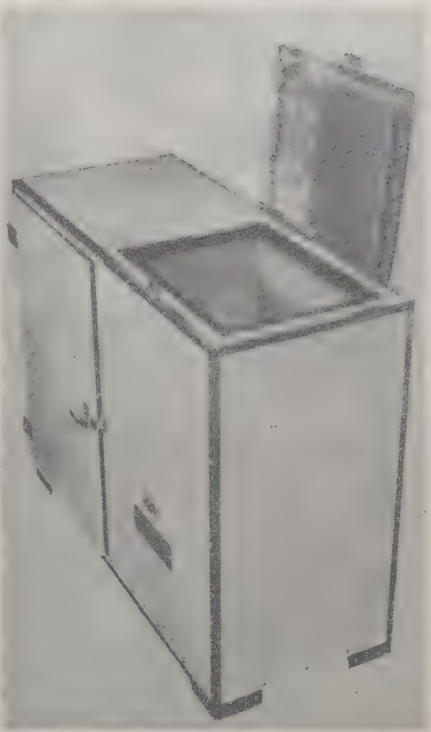


[J. H. Sorensen photo.

This takahe (notornis) was discovered by an official expedition this year and was the first chick of its species ever seen or recorded.

Quick Freezing—the Most Efficient Method of Preserving Foods

AS a method of preserving fruits and vegetables, quick freezing most nearly approaches the ideal, for the quality of the products is more like that of fresh fruits and vegetables than can be obtained with any other way of preserving. At present the big disadvantage of preserving for the houshold by quick freezing is its high initial expense. Compared with other household equipment, a quick-freeze cabinet ties up a large amount of capital, and at present it is probably out of reach of the average householder. Even in the United States of America, where deep freezing is used widely both commercially and in homes, it is rated as an expensive method of preserving foods for out-of-season use. Some quick-freeze cabinets have been sold in New Zealand recently, and this article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin, will be of interest to people who have such cabinets or are thinking of buying one as they become available.



[Campbell Photography photo.

A combined refrigerator and quick-freeze locker. The quick-freeze compartment is shown open.

QUICK FREEZING causes less change in flavour, vitamin content, and appearance of foods than other methods of preserving, and meat, fish, and cooked foods can be preserved easily. The texture is not affected and the method is safe and comparatively simple.

Quick-freeze cabinets do not perform the same function as refrigerators. Refrigerators merely chill foods, lengthening the time for which they may be kept. Foods cannot be preserved in an ordinary household refrigerator. Quick-freeze cabinets must be capable of lowering the temperature from freezing point to 7 degrees Fahrenheit below freezing point in 30 minutes. As a rule they maintain a temperature between zero F. and 10 degrees below, which is well below freezing point (32 degrees F.). Therefore a quick-freeze cabinet cannot be used to replace a refrigerator. Some refrigerators are made with quick-freeze compartments, but most of these are designed to store commercially-frozen foods.

Quick freezing is particularly well adapted for use when the home garden or farm produces most of the vegetables and fruits used. Both fruits and vegetables can be harvested when they are at their best and frozen at once, so that the products are of high quality. Any surplus at the flush of the season can be kept to add variety to the family's food at times when fresh vegetables and fruits may be unobtainable or expensive. In districts distant from markets and where vegetables can be produced during only a short season, a quick-freeze unit could make available a supply of vegetables throughout the year, thus raising the nutritional standards of the family and having a beneficial effect on its health. In households where a good deal of preserving is usually done, or where good supplies of fruit and vegetables are not obtainable all the year, installation of a quick freezer may be worth considering.

[Jack Welsh and Sons photo.

A quick-freeze cabinet of 9 cub. ft. capacity. It contains snap-freeze and storage compartments.

Foods which may be Frozen

Almost all fruits may be frozen, as may most vegetables which are cooked. Vegetables such as lettuce, radish, cucumber, tomatoes, or celery, which are most frequently used raw, are not suitable for freezing. Cabbage and onion should not be frozen. Peas and beans, spinach, kale, brussels sprouts, broccoli and cauliflower, beetroot, and carrots may be frozen, though it is not worth while to fill up valuable space with vegetables which may be stored satisfactorily in the fresh state.

Meat and fish are other foods which may be kept successfully in a quick-freeze cabinet, so that again such a unit is of special advantage for country houses; if the meat is home killed, the best use can be made of it without waste, and if it is bought, it may be obtained in larger quantities, which are more economical. Fish, too, can be taken home from town and

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frozen for use as required. Meat and fish can be kept for months in a quick-freeze cabinet compared with only days in a refrigerator.

Eggs can be preserved when removed from the shells, and breads, cakes, pies, and ice cream are other possibilities. Where bread is delivered infrequently it can be kept fresh in the freezer. Sandwiches, and even whole cooked meals, may be prepared days ahead of requirements and used as wanted. A quick-freeze cabinet gives the housewife the opportunity of preparing some foods in large quantity, so saving time and labour, and freezing it until it is wanted. This aspect has possibilities for lightening the extra demands on the farmer's wife at harvest or shearing time.

Handling Foods for Freezing

As freezing, even at zero F. as in quick freezing, does not kill the bacteria and moulds which spoil foods but only inactivates them, it is most important to have everything, including hands and utensils, scrupulously clean when handling food to be frozen. The water used to wash fruits or vegetables must be pure, and risk of contamination from flies, dust, or any other source should be avoided.

Fruit to be frozen should be mature, but not over-ripe. Vegetables are usually at their best just before full maturity. Only the highest quality should be used for freezing. They should be harvested in early morning if there is any risk of their wilting.

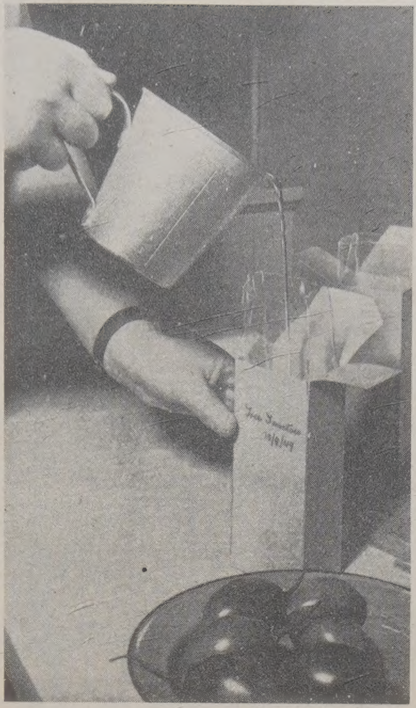
The sooner fruits and vegetables can be frozen after they are picked the better. They should always be frozen on the day on which they are harvested.

At present little information can be given about varieties most suitable for freezing in New Zealand, but fortunately results of experiments carried out in other countries are available.

Packing and Containers

Even when stored at a temperature below zero F., foods undergo some drying, so they must be packed and sealed in moisture- and vapour-proof containers, which also prevent flavours passing from one package to another. In every case room must be left at the top of the container for expansion during freezing. That is particularly important when the foods contain a high proportion of water or when liquid is added. A good rule is to allow space at the top equal to a tenth of the height of the container; less space need be left in flat containers than in deep ones. Some people who own quick-freeze units in New Zealand are using honey and oyster bottles for packing, sealing them with paraffin wax or icing them by placing them in the freezer for about an hour, dipping them quickly into cold water, and replacing them in the freezer so that a film of ice forms all over the containers.

Ordinary waxed paper is not suitable, nor are ice-cream cartons. At least one brand of moisture- and vapour-proof plastic wrapping is available in bags and sheets in New Zealand, and the bags may be used to line cartons for fruits and vegetables. This wrapping is sealed by running a warm iron along the edges. Food or liquid must not be spilled on the edges or an imperfect seal will result; a funnel may be used to avoid spilling. This material should not be confused with cellophane, which is satisfactory only for meats, but is best protected from tearing or cracking by an outer covering of stockinette.



[Campbell Photography photo.

Syrup being poured over fruit in a moisture- and vapour-proof plastic-lined carton. The carton is not filled to the top, allowing for expansion of the contents as they freeze.

Glass jars have been tried for fruits, but they take up more room, they break easily at low temperatures, and the food must be thawed before it is removed. It is also difficult to make jars airtight under quick-freeze conditions. They cannot be used for vegetables, which are better cooked without first being thawed.

A supply of containers is sometimes provided when a quick-freeze cabinet is bought in New Zealand, but as the obtaining of suitable containers presents some difficulties, here is a summary of the main points to look for when making a choice from what are available: The first essential is that the container be moisture- and vapour-proof; it should be sufficiently durable and sturdy to remain sealed; sealing and other handling should be easy, and rectangular packages are more economical of space in the freezer than round ones.

Foods are best packed so that a package contains enough for one meal. Packages should be labelled so that the contents and the date of their being put in the freezer are known.

Preparation of Fruits

Sort the fruit, discarding any which is not of good quality or is damaged in any way. Wash it thoroughly in cold water. Do not bruise it. Drain the fruit in a colander or wire basket or on a rack.

Most fruits are packed with sugar or in a syrup. Light, medium, or heavy syrup may be used according to preference, made as follows:—

Syrup		Water	Sugar
Light	..	4 cups	2 cups
Medium	..	4 cups	3 cups
Heavy	..	4 cups	4 cups

Heat the sugar in the water until it is dissolved, then cool the syrup thoroughly and chill it, if possible, before using it. Use only fresh syrup. Do not keep it for more than a few hours unless it is refrigerated. Two-thirds of a cup of syrup is sufficient for a pint of fruit. Cover the fruit with syrup, remembering that even after the syrup is added space must be left for expansion. Leave 1in. at the top of a quart container.

If the fruit is to be packed with sugar, use 3, 4, or 5lb. of fruit to 1lb. of sugar, depending on the kind of fruit and on preferences. Mix the fruit with the sugar by stirring them together with a wooden spoon or by adding the sugar gradually as the fruit is being poured from one bowl to another.

Seal all packages to make them completely moisture proof.

Berries: Raspberries, boysenberries, and blackberries are suitable. Sort and wash the fruit and drain them to empty the cavities. Pack them and cover them with syrup. The berries may be sliced or crushed and packed with sugar instead of syrup.

Plums: Choose varieties with a tart flavour and pack them with syrup. They may be better sliced and stoned to save space.

Apricots: Wash and halve the fruit and remove the stones. Discoloration may be prevented by dipping the apricots into boiling water for ½ minute (a few at a time in a colander or wire basket) then cooling them at once in cold water. Alternatively, ascorbic acid (which may be bought from a chemist) may be added to the syrup to retard browning; use ½ teaspoon of crystalline ascorbic acid to 8 pints of fruit. Cover the fruit with the syrup. A pad of waxed paper may be placed on top of the fruit to keep it under the syrup.

Peaches: Use only freestone and preferably yellow-fleshed peaches. Blanch them in boiling water until the skin loosens (about ½ minute) and cool them at once in cold water. Peel them, remove the stones, and slice the fruit into cold syrup, with ascorbic acid added, in the container. Use the same quantity of ascorbic acid as for apricots, or dip the slices into boiling water for a minute and cool them rapidly in cold water to prevent discoloration. The syrup must cover the fruit.

Gooseberries: Top, tail, wash, and drain the fruit. They may be packed dry without sugar if desired.

Currants: Sort, wash, and drain them. Either pack them and cover them with syrup or mix them with sugar before packing them.

QUICK FREEZING OF FOODS . . .

Rhubarb: Choose red, tender rhubarb. Wash and drain it, cut it into 1in. lengths, pack it, and cover it with syrup. For pies the rhubarb can be packed dry.

Other fruits may also be frozen, and the instructions given should serve as a guide in the preparation of similar fruits. Tree tomatoes and passion fruit are good frozen, and Chinese gooseberries may be worth trying.

Vegetables

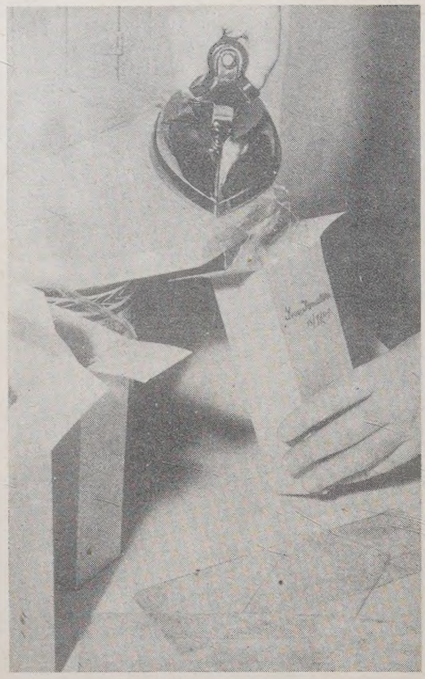
Vegetables are more difficult to preserve than fruits, and that also applies to quick freezing, for which they require one more step in preparation than do fruits. The vegetables are thoroughly washed in cold water, then graded according to size and maturity. Most are prepared as for cooking.

Vegetables contain substances called enzymes which are concerned with the maturing processes. When vegetables are to be preserved it is necessary to stop or retard the action of these enzymes before they cause deterioration. In canning or bottling, the enzymes are killed by heat, along with bacteria and moulds. When vegetables are stored by quick freezing, the enzyme action is retarded by scalding, followed by rapid cooling, freezing at once, and keeping at zero F. or colder.

The time for blanching depends on the size of the vegetable, and grading should be carried out carefully so that pieces of the same size and maturity are treated together. Too much or too little scalding lowers the quality of the product.

To blanch vegetables, have a large container of boiling water on the stove and lower them into it in a wire basket or muslin bag. Do a little at a time, and see that the vegetables are not packed tightly in the basket or bag or all pieces may not be heated equally. Not more than 1lb. of vegetables should be scalded at a time in 8 to 10 quarts of boiling water. If a large quantity of vegetables is being prepared, the copper may be used for scalding or more than one container of water can be used on the stove. The water must come back to the boil within 60 to 75 seconds of the vegetables being added.

Count the time carefully from the moment of immersion according to the timetable given below and remove the vegetables as soon as the time is up. Plunge them into cold water at once and keep them there until they are cool to touch. The colder the water the better; the sudden change of temperature helps to check the enzyme action and reduces the risk of the vegetables developing a cooked flavour because of the heating. Running water is an advantage. Do not allow the vegetables to soak in the water, but remove them as soon as they are cool. Drain the pieces and pack them into containers. Do not add liquid and, as for fruits, leave room for expansion.



[Campbell Photography photo.

The top of a plastic bag being sealed with a warm iron. The board is raised to about carton height for convenience in handling filled cartons.

When the time given for blanching ranges from 2 to 3 minutes, for example, allow the shorter time for young, tender vegetables and the longer time for more mature ones.

Meat, Poultry, and Fish

No special preparation is necessary with meat, poultry, or fish. Space is economised by using cuts containing a small proportion of bone and by boning when possible. Seal enough for a meal, or the quantity which is to be cooked at one time, in one cellophane or plastic wrapping.

Eggs

Eggs cannot be frozen in the shells, as the contents expand and break the shells. The eggs are shelled and beaten just enough to mix them. It is necessary to add either 1 tablespoon of sugar or 1 teaspoon of salt to each 8oz. cup of liquid egg.

Yolks and whites may be frozen separately, in which case 2 tablespoons of sugar should be added to each cup of yolks, but the whites do not need any additions.

General Management of the Freezer

Careful arrangement will make the best use of space in the freezer. Wire baskets or trays or plywood partitions are helpful in achieving space economy and ease of access. A plan showing the location of the varieties of foods in the cabinet may be kept attached to the lid or door. A list of the foods and the quantities of each kind is helpful in avoiding searches and the lid being kept open too long. The freezer should never be opened unnecessarily or kept open for longer than can be helped.

Defrosting is necessary once or twice a year. Choose a time when the freezer contains little, and if a refrigerator is not available to hold the goods while defrosting is being carried out, wrap them in a heavy blanket or rug. Replace them in the cabinet as soon as possible.

If the power fails, the freezer should not be opened at all. The cabinet should be so well insulated that a power break of some hours does no harm provided the lid is kept closed.

Overseas experiments show that fruits, vegetables, and beef may be kept in prime condition in the freezer up to 12 months. They may be kept longer, but quality will deteriorate slowly. Mutton and poultry may be stored up to 10 months, pork, butter, and fish up to 8 months, and most ready-cooked foods up to 4 months.

Using the Products

Fruits may be used raw after being thawed or they may be cooked. Some are best not quite fully thawed. The package should not be opened until the contents have thawed.

As a rule, vegetables do not need thawing before they are cooked, but corn is an exception; it is best thawed first. The usual cooking time can be reduced slightly for frozen vegetables, but they must be cooked before being eaten.

Fish is best thawed before being cooked, but thawing is optional for meat. If meat is not thawed, add 20 minutes per pound to the usual cooking time.

Keeping frozen foods once they have thawed is dangerous, for the freezing does not kill spores of bacteria and they may grow once the food warms to room temperature. Frozen foods may be kept in a refrigerator for a few hours or over night, or in the ice-cube compartment for 2 to 3 days. The packages should not be opened until just before they are to be used and food which has thawed should never be refrozen.

When cooked foods are to be thawed after being frozen, the wrappings must be left on during the process to prevent condensation of moisture on to the cold food. If the wrappings are removed, the crust or outer surface of cooked food becomes soggy because of the condensation.

◆

BLANCHING TIMETABLE FOR VEGETABLES

Vegetable	Size	Time in minutes
Asparagus	Up to ½in. diameter	2-3
French and runner beans—		
Tender	Cut pieces	2½
Not so tender	Cut pieces	3½
Broccoli	Not more than 1in. thick	4
Brussels sprouts	Medium to large	4
Carrots	Diced	3
Corn	Cut or on the cob	8-10
Peas (discard hard and over-mature peas)—	Small	2
	Large	2½
Spinach, very tender to slightly mature		2-3
Spinach, New Zealand (use only young leaves)		2

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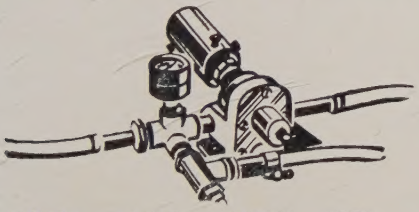

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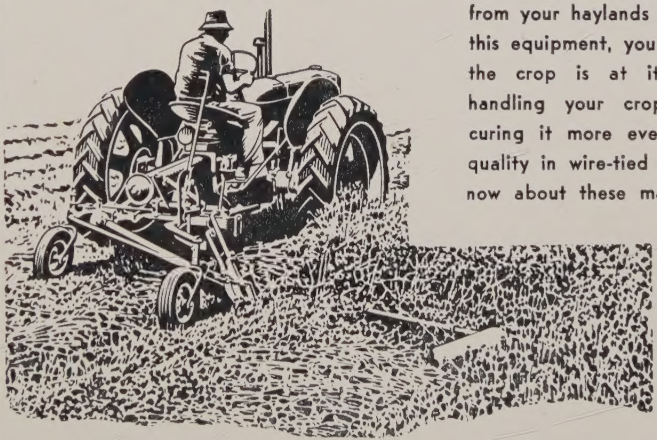

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